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Bulletin

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DEPARTMENT OF AGRICULTURE

BULLETIN No. 210

PROCEEDINGS OF THE
THIRTY-FOURTH ANNUAL MEETING

OF THE

Pennsylvania
State Board of Agriculture



HELD IN THE

BOARD OF TRADE BUILDING, HARRISBURG, PA.

January 24, 25 and 26, 1911

HARRISBURG:

C. E. AUGHINBAUGH, PRINTER TO THE STATE OF PENNSYLVANIA

1911



Commonwealth of Pennsylvania.

DEPARTMENT OF AGRICULTURE

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MEMBERS

OF THE

PENNSYLVANIA

STATE BOARD OF AGRICULTURE

FOR THE YEAR 1911

MEMBERS EX-OFFICIO

HON. JOHN K. TENER, Governor.
 HON. HENRY HOUCK, Secretary of Internal Affairs.
 DR. N. C. SCHAEFFER, Superintendent of Public Instruction.
 DR. EDWIN EARLE SPARKS, President of the State College.
 HON. A. E. SISSON, Auditor General.
 HON. N. B. CRITCHFIELD, Secretary of Agriculture.

APPOINTED BY THE GOVERNOR

R. I. Young, Middletown, Dauphin County, ...Term expires 1911
 R. H. Thomas, Jr., Mechanicsburg, Cumberland County Term expires 1912
 Gen. James A. Beaver, Bellefonte, Centre County, ...Term expires 1913

APPOINTED BY THE STATE POULTRY ASSOCIATION

J. D. Nevius, ...Philadelphia, ...1910

APPOINTED BY THE PENNSYLVANIA BRANCH OF THE AMERICAN POULTRY ASSOCIATION

W. Theo. Wittman, ...Allentown, ...1913

ELECTED BY COUNTY AGRICULTURAL SOCIETIES

	Term expires.
Adams, ...A. I. Weidner, ...Arendtsville,	1912
Allegheny, ...A. J. Purdy, ...Imperial, R. F. D. No. 1,	1912
Armstrong, ...S. S. Blyholder, ...Kelly Station,	1914
Beaver, ...A. L. McKibben, ...New Sheffield,	1914
Bedford, ...David W. Lee, ...Bedford,	1912
Berks, ...H. G. McGowan, ...Geiger's Mills,	1913
Blair, ...W. Frank Beck, ...Altoona,	1914
Bradford, ...F. D. Kerrick, ...Towanda,	1913
Bucks, ...B. Frank Wambold, ...Sellersville,	1914
Butler, ...W. H. Milliron, ...Euclid,	1914

Term epires.

Cambria, ...	Jas. Westrick, ...	Patton, R. F. D. No. 2, ...	1913
Cameron, ...			
Carbon, ...			
Centre, ...	John A. Woodward, ...	Howard, ...	1912
Chester, ...	M. E. Conard, ...	Westgrove, ...	1912
Clarion, ...	J. H. Wilson, ...	Clarion, ...	1913
Clearfield, ...	Peter Gearhart, ...	Clearfield, ...	1913
Clinton, ...	J. A. Herr, ...	Millhall, R. F. D., ...	1914
Columbia, ...	A. P. Young, ...	Millville, ...	1912
Crawford, ...	J. S. Patton, ...	Hartstown, ...	1914
Cumberland, ...			
Dauphin, ...	Edward S. Keiper, ...	Middletown, ...	1914
Delaware, ...	E. J. Durnall, ...	Swarthmore, ...	1914
Elk, ...	John M. Witman, ...	St. Mary's, ...	1911
Erie, ...			
Fayette, ...			
Forest, ...			
Franklin, ...	John P. Young, ...	Marion, ...	1914
Fulton, ...	J. L. Patterson, ...	McConnellsburg, ...	1913
Greene, ...	N. M. Biddle, ...	Carmichaels, ...	1913
Huntingdon, ...	Geo. G. Hutchison, ...	Warrior's Mark, ...	1912
Indiana, ...	S. C. George, ...	West Lebanon, ...	1913
Jefferson, ...	Peter B. Cowan, ...	Brookville, ...	1913
Juniata, ...	Matthew Rodgers, ...	Mexico, ...	1912
Lackawanna, ...	Horace Seamans, ...	Factoryville, ...	1913
Lancaster, ...	J. Aldus Herr, ...	Lancaster, ...	1914
Lawrence, ...	Sylvester Shafter, ...	New Castle, ...	1913
Lebanon, ...	H. C. Snively, ...	Cleona, ...	1913
Lehigh, ...	P. S. Fenstermaker, ...	Allentown, ...	1912
Luzerne, ...	J. C. Hildebrant, ...	Dallas R. F. D., ...	1914
Lycoming, ...	A. J. Kahler, ...	Hughesville, ...	1912
McKean, ...	O. W. Abbey, ...	Turtle Point, ...	1913
Mercer, ...	W. C. Black, ...	Mercer, ...	1914
Mifflin, ...	M. M. Naginey, ...	Milroy, ...	1913
Monroe, ...	F. S. Brong, ...	Saylorsburg, ...	1913
Montgomery, ...	John H. Schultz, ...	Norristown, ...	1914
Montour, ...	J. Miles Derr, ...	Milton, R. F. D., ...	1913
Northampton, ...	C. S. Messinger, ...	Tatamy, ...	1912
Northumberland, ...	I. A. Eschbach, ...	Milton, R. F. D., ...	1914
Perry, ...	A. T. Holman, ...	Millerstown, ...	1913
Philadelphia, ...	David Rust, ...	Philadelphia, ...	1913
Pike, ...			
Potter, ...			
Schuylkill, ...	John Shoener, ...	New Ringgold, ...	1913
Snyder, ...			
Somerset, ...	John C. Weller, ...	Rockwood, ...	1914
Sullivan, ...	J. G. Colts, ...	Campbellsville, ...	1914
Susquehanna, ...	Frank A. Davies, ...	Montrose, ...	1913
Tioga, ...	Calvin H. DeWitt, ...	Mansfield, ...	1914
Union, ...	J. Newton Glover, ...	Vicksburg, ...	1914
Venango, ...			
Warren, ...	R. J. Weld, ...	Sugargrove, ...	1914
Washington, ...	D. S. Taylor, ...	Burgettstown, ...	1914
Wayne, ...	Warren E. Perham, ...	Pleasant Mount, ...	1914
Westmoreland, ...	M. P. Shoemaker, ...	Greensburg, ...	1913
Wyoming, ...	D. A. Knuppenburg, ...	Lake Carey, ...	1913
York, ...	G. F. Barnes, ...	Rossville, ...	1914

OFFICERS

PRESIDENT

Hon. John K. Tener, Governor, ... Harrisburg.

VICE PRESIDENTS

Geo. G. Hutchison, ... Warrior's Mark.
 A. J. Kahler, ... Hughesville.
 Peter Gearhart, ... Clearfield.

EXECUTIVE COMMITTEE

Dr. M. E. Conard, Chairman, ... Westgrove.
 Dr. W. Frank Beck, ... Altoona.
 J. A. Herr, ... Millhall, R. F. D.
 Matthew Rodgers, ... Mexico.
 F. D. Kerrick, ... Towanda.
 M. M. Naginey, ... Milroy.
 D. A. Knuppenburg, ... Lake Carey.
 R. J. Weld, ... Sugargrove.
 A. P. Young, ... Millville.
 N. B. Critchfield, Secretary, ... Harrisburg.

ADVISORY COMMITTEE, CONSULTING SPECIALISTS AND STANDING COMMITTEES AS REPORTED BY THE EXECUTIVE COMMITTEE.

ADVISORY COMMITTEE

Matthew Rodgers, ... Mexico.
 J. A. Herr, ... Millhall, R. F. D.
 M. M. Naginey, ... Milroy.
 N. B. Critchfield, Secretary, ... Harrisburg.

CONSULTING SPECIALISTS

Botanist, ... Prof. W. A. Buckhout, ... State College.
 Pomologist, ... Gabriel Hlester, ... Harrisburg.
 Chemist, ... Dr. Wm. Frear, ... State College.
 Veterinary Surgeon, ... Dr. C. J. Marshall, ... Harrisburg.
 Sanitarian, ... Dr. W. H. Banks, ... Mifflintown.
 Microscopist and Hygienist, ... Prof. J. W. Kellogg, ... Harrisburg.
 Entomologist, ... Prof. Franklin Menges, ... York.
 Ornithologist, ... Prof. H. A. Surface, ... Harrisburg.
 Meterologist, ... E. R. Demain, ... Harrisburg.
 Mineralogist, ... Baird Halberstadt, ... Pottsville.
 Apiarist, ... H. C. Klinger, ... Liverpool.
 Economic Geologist, ... Dr. Isaac A. Harvey, ... Lock Haven.
 Agricultural Geologist, ... W. H. Stout, ... Pinegrove.
 Forests and Forestry, ... Robert Conklin, ... Harrisburg.
 Feeding Stuffs, ... G. G. Hutchison, ... Warrior's Mark.

STANDING COMMITTEES

LEGISLATION

Hon. H. G. McGowan, Chairman, ... Geiger's Mills.
 P. Gearhart, ... Clearfield.
 Matthew Rodgers, ... Mexico.
 S. S. Blyholder, ... Kelly Station.
 Hon. H. C. Snively, ... Cleona.

CEREALS AND CEREAL CROPS

J. Miles Derr, Chairman, ... Milton.

ROADS AND ROAD LAWS

J. C. Weller, Chairman, ... Rockwood.

FRUIT AND FRUIT CULTURE

J. P. Young, Chairman, ... Marlon.

DAIRY AND DAIRY PRODUCTS

M. E. Conard, Chairman, ... West Grove.

FERTILIZERS

J. H. Shultz, Chairman, ... Norristown.

WOOL AND TEXTILE FIBERS

A. L. McKibben, Chairman, ... New Sheffield.

LIVESTOCK

A. P. Young, Chairman, ... Millville.

POULTRY

W. Theo. Wittman, Chairman, ... Allentown.

**PROCEEDINGS OF THE THIRTY-FOURTH ANNUAL
MEETING OF THE STATE BOARD OF AGRICULTURE,
HELD IN THE BOARD OF TRADE BUILDING,
HARRISBURG, PA., JANUARY 24, 25 AND 26, 1911.**

Harrisburg, Pa., January 24, 1911, 9 A. M.

Vice President S. S. Blyholder in the Chair.

The CHAIRMAN: The Board will please come to order, and the Secretary will call the roll.

The roll of members was then called by the Secretary and at this and subsequent roll calls the following persons answered:

R. I. Young, R. H. Thomas, Jr., Gen. James A. Beaver, W. Theo. Wittman, A. I. Weidner, A. J. Purdy, S. S. Blyholder, A. L. McKibben, David W. Lee, H. G. McGowan, W. Frank Beck, F. D. Kerrick, B. Frank Wambold, John A. Woodward, M. E. Conard, Peter Gearhart, J. A. Herr, A. P. Young, J. F. Seavy, E. J. Durnall, John P. Young, George G. Hutchison, Peter B. Cowan, Matthew Rodgers, Horace Seamans, J. Aldus Herr, Sylvester Shaffer, H. C. Snively, A. J. Kahler, W. C. Black, M. M. Naginey, F. S. Brong, J. H. Shultz, J. Miles Derr, C. S. Messinger, I. A. Eschbach, A. T. Holman, John Shoener, John C. Weller, E. R. Warburton, J. Newton Glover, R. J. Weld, Warren E. Perham, M. P. Shoemaker, D. A. Knuppenburg and G. F. Barnes.

Ex-officio members:

Hon. John K. Tener, Governor, Dr. N. C. Schaeffer, Superintendent of Public Instruction, Dr. Edwin Earle Sparks, President of the State College and Hon. N. B. Critchfield, Secretary of Agriculture.

The following Consulting Specialists were also in attendance: Gabriel Hiester, Pomologist; Prof. J. W. Kellogg, Microscopist and Hygienist; Prof. Franklin Menges, Entomologist; Prof. H. A. Surface, Ornithologist; Baird Halberstadt, Mineralogist; W. H. Stout, Agricultural Geologist; G. G. Hutchison, Feeding Stuffs.

The SECRETARY: (After calling of roll) There is a quorum present, Mr. Chairman.

The CHAIRMAN: We are now ready to proceed with the reading of the minutes. The Secretary will now read the minutes of the Spring Meeting of the State Board of Agriculture, held in Butler, Pa., Tuesday, May 24, 1910.

The minutes were then read by the Secretary.

The CHAIRMAN: Gentlemen, you have heard the reading of the minutes. Are there any corrections?

MR. HUTCHISON: Mr. Chairman, I move the minutes be received and approved.

MR. R. I. YOUNG: Mr. Chairman, I second the motion.

The motion was agreed to.

The CHAIRMAN: I will appoint the Committee on Credentials as follows: Matthew Rodgers, of Juniata County; D. A. Knuppenburg, of Wyoming County; M. M. Naginey, of Mifflin County; Peter Gearhart, of Clearfield County, and E. R. Warburton of Sullivan County.

The Chairman of the Committee will please come forward and receive the credentials already handed in. If there are any other credentials to hand in before we proceed with the regular program turn them over to the Chairman of the Credential Committee now.

MR. RODGERS, Chairman of the Credential Committee: The members of the Credential Committee will please retire with me now to the ante-room to act on the credentials presented.

The CHAIRMAN: We are now ready to take up the reports of the Standing Committees and Specialists. The first on the program is the Report of the Committee on Cereals and Cereal Crops, J. Miles Derr, Chairman, Milton, Penna.

This report was then read by Mr. Derr as follows:

REPORT OF THE COMMITTEE ON CEREALS AND CEREAL CROPS.

By J. MILES DERR, *Chairman.*

The production of cereals and cereal crops may be considered the greatest industry of the present day. On account of its importance to all classes of people it should receive a great deal of consideration. We have in our country several million acres of as fine land as ever kissed by the sun or tickled with a hoe. One crop from the farms of our great country would pay for all the railroad property of the United States.

Corn.

Let us consider a few of the leading cereals produced in the United States: "Corn is King," and has been properly named on account of its importance as a feed and value of the product. It is by far the most valuable cereal we raise. Our corn crop is worth more every year than all we get from our gold, silver and lead mines. It has been estimated that our corn crop is worth more than twice as much as our wheat crop. Our annual corn crop averages more than two billion bushels of shelled corn every year. Corn is raised in nearly every part of the United States. Ohio has the highest average per acre, about forty-two bushels; Pennsylvania third

and Florida lowest, about eleven bushels per acre. More than one-half of our corn crop comes from the seven great states: Illinois, Iowa, Missouri, Kansas, Nebraska, Indiana and Ohio. This is the greatest corn patch on the face of the earth. It produces more than one billion bushels of corn every year, or more than one-half our corn crop. Can we realize how much corn one billion bushels is. Suppose it would be loaded upon wagons, forty bushels of shelled corn to a wagon, and driving the teams so that the noses of each team would just reach the tailboard of the wagon in front of it, making a continuous train of wagons more than one hundred and fifty thousand miles long, or long enough to reach six times around the world. These seven states produce about one-half of our corn crop, and if we want to know how many wagons it would take to carry a whole crop, multiply the number by two.

What is done with this immense crop of corn? About nineteen-twentieth of it is fed to stock in this country. About one twentieth is shipped to Europe. Corn is the chief food of about forty million hogs raised annually in this country.

Wheat.

Winter wheat may be considered second in value and importance. Wheat is one of the most important grains known to man. It has been used for ages by the people of the Old World. Wheat was not known in this hemisphere before the time of Columbus, and our continent now produces more wheat than any other grand division of the globe. The United States as a nation takes the lead in the production of wheat. A large percentage of the people of Europe eat bread made from our wheat. Millions of bushels of this grain every year cross the Atlantic, and, with the exception of cotton, we get more for our wheat from foreign countries than any other crop. Wheat is grown in nearly all parts of the United States, but our best wheat lands lie north of the Ohio and Missouri rivers. Let us note some facts about one of the largest wheat farms in our country:

On a certain wheat farm in North Dakota there are two hundred and fifty pairs of work horses and mules, two hundred plows, one hundred and fifteen harvesting machines, and twenty threshing machines run by steam. When the grain is ripe, four hundred men are employed to harvest it, and at the time of threshing there are six hundred men at work. Some of the fields contain 500 acres each. The men working in them labor in companies, under mounted overseers. In plowing the ground, scores of sulky plows, driven by men who sit on the plows, will move across the field together, plowing several acres each round.

Harvesting on these big farms is a wonderful sight. On such a farm as the one being described, the work of cutting and threshing is done at the same time by a combined harvester and thresher. Some of these great machines are drawn by steam engines; others by teams of twenty-five to thirty horses or mules. A single machine with four men will gather and thresh from seventeen hundred to three thousand bushels of wheat in a day.

The next question is, How is the wheat cared for after it leaves the fields?

This is almost as great a business as raising the wheat. At some of the railroad stations in the wheat belt, and at all the large grain ports of the United States, there are large elevators, or granaries, used for storing the grain until it is wanted for sale. A single elevator often has storage room for more than a million bushels of grain. The elevators at Minneapolis alone can hold almost thirty million bushels at one time.

The great wheat crop and the location at the head of navigation on the Mississippi River has caused two thriving commercial cities to be built, known as the "Twin Cities of the Northwest"—Minneapolis and St. Paul. They contain some of the finest business blocks in our country. The two cities now almost join, although their business centers are about ten miles apart. I have just described the greatest belt in the United States, and yet their average yield per acre would not satisfy many of our Pennsylvania farmers who are accustomed to having average yields of twenty bushels per acre, and I have in mind plots of 15 acres and more yielding an average of thirty-two bushels per acre.

Oats.

The oats crop of the country ranks third in importance. We produce about one billion bushels annually and it is worth three hundred million dollars.

Oats are produced in every state and territory in the United States. Iowa leads in the number of acres sown, Arizona the lowest. Utah leads in the average number of bushels per acre, being about forty-three bushels per acre, and Florida the lowest, with fourteen bushels per acre. Iowa produces the greatest number of bushels. Florida has the highest price per bushel, South Dakota the lowest.

Other Products.

Next in importance is barley. California leads in total number of bushels produced, with about thirty-seven million bushels. California also leads in the number of dollars to her credit.

Rye comes next in importance. All but ten of the states and territories produce rye. Michigan leads in number of acres. Idaho produces most bushels per acre. Pennsylvania leads in total number of bushels. South Carolina has the highest average price per bushel, being one dollar and a quarter. Pennsylvania leads in the total value of rye, having to her credit about three and one-half million dollars.

Buckwheat is a very important crop, for several reasons: It is a quick crop and is in demand as soon as harvested; it can be produced on land that will not produce wheat, corn or oats successfully. Buckwheat is grown in twenty-four states. New York leads with 321,552 acres. Maine has the highest number of bushels per acre, about twenty-seven bushels, and Iowa the lowest, twelve bushels per acre. New York is the banner buckwheat state, her crop annually being worth three and one-half million dollars, or about one-third of the value of the buckwheat crop of the United States.

Flax, another important crop, is raised in this country for the seed which is manufactured into oil and meal. About two and one-half million acres are producing flax with an average of a little more

than ten bushels per acre. In some sections during 1910 flaxseed was worth two and one-half dollars per bushel. In the production of flax, North Dakota leads in number of acres, the total number of bushels and value of its crop amounts to nearly fifteen million dollars.

Rice is produced in nine or ten states, with Louisiana leading in number of acres, 308,000, the greatest number of bushels and the largest total value, being nearly eight million dollars, which is about one-half the value of our whole crop.

The United States Department of Agriculture reports the total production of corn at 3,125,713,000 bushels as compared with 2,772,376,000 bushels for 1909, 27.4 bushels average per acre for 1910 as compared with 25.5 bushels the ten year average.

These figures seem large, and it is hard to realize how enormous they are, yet the latest census report showing the great increase in the population of our country, and especially, the alarming increase in our cities, makes it apparent that the greatest problem before the farmers of our fair country at the present time is the conservation of soil fertility, and its economical increase. Another half century of the reckless and wasteful manner of using the soil, as has been done in nearly all sections of our country, will see the highest cost of living that has ever afflicted any nation.

The United States report gives a comprehensive view of the crop of this country. One of our local papers gives a little better idea of the intensive farming of Pennsylvania. It is as follows:

"GREAT FARM STATE. PENNSYLVANIA LEADS ALL THE OTHERS IN INTENSIVE FARMING. PRODUCED FIVE PER CENT. OF THE CROP VALUE ON LESS THAN FOUR PER CENT. OF THE ACREAGE. That the State of Pennsylvania is leader in intensive farming, the doctrine of which is being preached by the State College and the Pennsylvania railroad, is indicated by statistics just compiled by the Pennsylvania Railroad Company for 1910 which show that Pennsylvania last year had 8,384,000 acres in cultivation in corn, barley, buckwheat, hay, oats, potatoes, rye, tobacco and wheat. This is 3.503 per cent. of the total of 239,343,800 acres under cultivation in these crops in the United States, and the average value per acre in the State of Pennsylvania was \$20.56 as compared with \$14.53 for the average value per acre throughout the country. These figures are of special interest to the Pennsylvania Railroad, which in the past four years has been conducting an active campaign in the interests of scientific farming. Much instructive literature has been disseminated by the railroad company in pamphlet form, while farmers' special educational trains have been operated on various divisions from time to time. In this work the railroad company is co-operating with the State Agricultural Department and the State College of Agriculture. The Pennsylvania railroad recently announced that it had found its farming campaign a profitable one and that it intended to prosecute it vigorously during the present winter. Arrangements are being made for demonstrations and lectures to be given in various parts of the State of Pennsylvania. The country's total farm crop value of barley, buckwheat, corn, hay, oats, potatoes, rye, tobacco and wheat in 1910 was \$3,478,417.773 and Pennsylvania's share of this was \$172,362,500, or approximately five per cent. of the total, with only 3.5 per cent. of the acreage. Added

interest is given to these figures in view of the fact that in 1909 Pennsylvania's acreage in the above crops was 3.547 per cent. of the total of the country, with the percentage of the farm crop value for Pennsylvania of 4.311, compared with 1910. Pennsylvania's percentage of acreage decreased, but her percentage of the revenue in these crops increased.

MR. J. A. HERR: Mr. Chairman, I move that the report be received and placed on file for publication with the proceedings of the Board.

The motion was seconded and agreed to.

The CHAIRMAN: The next on the program is the Report of the Committee on Roads and Road Laws, H. C. Snavely, Chairman, Cleona, Penna.

The SECRETARY: Mr. Chairman, I have a letter from Mr. Snavely that came in just a little while ago. It is addressed to me personally. Shall I read it?

The CHAIRMAN: The Secretary will please read the letter.

The Secretary read Mr. Snavely's letter as follows:

"Cleona, Pa., Jan. 23, 1911.

Hon. N. B. Critchfield,
Harrisburg, Penna.

Dear Sir: I have been confined to bed and to the house since Thursday night when I took sick rather suddenly.

My coming to Harrisburg tonight or tomorrow will depend upon the advice of the doctor when he comes to see me this P. M.

I wish also to say that I have not written a report as Chairman of Committee of Roads and Road Laws.

I had written to a number of members of the Board and others for their views, but receiving only a few replies I deferred the matter until my return home last week when I took ill. I would be very sorry if I would miss all the meetings this week.

Yours truly,

HENRY C. SNAVELY."

The CHAIRMAN: Gentlemen, you have heard the communication. What action will you take? If there are no objections we will proceed and enter it upon the journal of our proceedings.

The SECRETARY: Mr. Chairman, I have another letter here from Mr. Cowan, also addressed to me personally.

The CHAIRMAN: The Secretary will please read Brother Cowan's communication.

The Secretary read Mr. Cowan's letter as follows:

"Brookville, Pa., Jan. 23, 1911.

Hon. N. B. Critchfield,
Secretary of Agriculture,
Harrisburg, Pa.

My dear Sir: Owing to the death of a dear sister, I will be unable to attend the early sessions of the State Board of Agriculture, but will try to reach there some time Wednesday, 25.

Trusting the meeting will be a pleasant and profitable one, I remain,

Very truly yours,

P. B. COWAN."

The CHAIRMAN: The communication will be received and entered upon the journal of our proceedings.

The SECRETARY: Mr. Chairman, I have also received a letter from Mr. Fenstermaker, addressed to me personally.

The CHAIRMAN: The Secretary will please read Brother Fenstermaker's letter.

The Secretary read Mr. Fenstermaker's letter as follows:

"Allentown, Pa., Jan. 23, 1911.

Hon. N. B. Critchfield,
Harrisburg, Pa.

My dear Sir: The very sudden and unexpected death of our beloved daughter Anna, aged 22 years, has made it impossible for me to attend your great meetings.

Overcome with grief and cares, allow me to predict that these meetings with your most excellent program of a feast of good things can not but help to produce results in creating a more intense interest for better agriculture. Kindly convey my regrets to the members of the State Board and oblige.

Very sincerely yours,

P. S. FENSTERMAKER."

The CHAIRMAN: The communication will be received and entered upon the journal of our proceedings.

MR. HUTCHISON: Mr. Chairman, I move that the Secretary be directed to reply to the letter of Brother Fenstermaker, extending our sympathies in this said hour of bereavement.

The motion was seconded and agreed to.

The SECRETARY: Mr. Chairman, I have prepared a telegram in expectation of this. I felt every assurance that somebody would make the motion, and the telegram that I propose to send, if approved, is as follows:

"The Hon. P. S. Fenstermaker,
Allentown, Penna.

At the Annual Meeting of the State Board of Agriculture, now assembled, the society unanimously voted that we extend to our co-worker, Hon. P. S. Fenstermaker, of Allentown, Pa., the expression of our sympathy in the time of such bereavement that has so suddenly fallen upon his home."

The CHAIRMAN: Without any further motion the Secretary, by direction of the Board, will forward that message.

The CHAIRMAN: The next on the program is the Report of the Committee on Fruit and Fruit Culture, D. A. Knuppenburg, Lake Carey, Pa. Is Mr. Knuppenburg present?

MR. HUTCHISON: I believe he is on the Committee on Credentials.

The SECRETARY: Mr. Hutchison, will you be kind enough to ask the Committee to excuse him until he makes his report?

Mr. CHAIRMAN: While there is nothing before the Board, I wish to announce that it will be necessary for us at some time to have a report of the Memorial Committee, and I think possibly it might be well to appoint that Committee at this time, so that if the Committee wish to do so they can collect any facts that they wish to incorporate in their record. I don't want to make the motion, but if there is no objection, knowing that such Committee is needed, I cannot see why the Chairman cannot proceed to the appointment of such Committee and yet, if it be thought best, it will be all right to make the motion. I make this suggestion simply for the reason that it is so customary to make the originator of the motion the Chairman of the Committee that perhaps the members of the Board might hesitate to make the motion for that reason.

The CHAIRMAN: Do I hear a motion to that effect?

MR. WELD: Mr. Chairman, I move that the Memorial Committee be appointed by the Chair.

The motion was agreed to.

MR. HUTCHISON: Mr. Chairman, I find Mr. Knuppenburg is not with the Committee and I cannot find him upstairs at the Horticultural meeting, though he is said to be about.

The SECRETARY: Mr. Chairman, are you ready to announce that Committee while we wait?

The CHAIRMAN: I will appoint as the Memorial Committee Mr. Weld, Mr. Black and Mr. Hutchison.

The SECRETARY: Mr. Chairman, I would suggest that in the absence of Mr. Knuppenburg, perhaps someone who is on the program for this afternoon to make a report can be heard now.

The CHAIRMAN: Very good suggestion. Now, will some gentleman who is on the program for this afternoon volunteer to make his report now?

The SECRETARY: I was just going to suggest that possibly Mr. Hutchison might go ahead.

MR. HUTCHISON: I guess the best thing to do when a fellow has a bad job is to get rid of it. I have my report here but not quite classified as I wish to have it. Though I have not got it paged, I think I can go on with it, and if I get off at the wrong place when it gets to the printer I will endeavor to have it then in the proper shape. If you will take chances on it I will go ahead.

The CHAIRMAN: We will now hear from Mr. Hutchison, on the Report on Feeding Stuffs.

MR. HUTCHISON: Mr. Chairman, I am not going to read all of this report. I would just say before I read that this work has developed so largely that it is an impossibility to make a report of all the work that is done by the Secretary, and by his assistants, or those employed by him. It would require a bulletin to make such a report to you. But I will refer in my report to a bulletin that is published that will give you a large proportion of the work accomplished.

Mr. Hutchison thereupon read his report as follows:

REPORT OF THE COMMITTEE ON FEEDING STUFFS.

By GEORGE G. HUTCHISON, *Chairman.*

To the Honorable Members of the State Board of Agriculture:

As your Chairman of Committee on Concentrated Commercial Feeding Stuffs, I beg leave to make you the following report for the year 1910:

With our new law that was placed upon the statute books by the last Legislature, which went into effect August 1st, 1909, we were in a position to proceed with our work with new courage. As stated to you in our last report, the old law was declared unconstitutional by Judge Tressler of Lehigh county. Our determination was to rid the State as far as possible of all feeds that were adulterated and falsely guaranteed. I hope to show you in this report that we have been in a measure successful, and that we have entered upon an epoch in the control of the sale of Concentrated Commercial feeds in Pennsylvania.

I would first call your attention to the condition that exists among the millers in our own State. Before the passage of a Feeding Stuff Law, a large number of them bought adulterants to adulterate their feeds, but at the present time, the majority of them are grinding whole grains, that is, corn, oats and rye. They do not compound or mix to any great extent. Rather, they buy their concentrated feeds from the large manufacturers in the West and sell them as they are received. The millers of our State still pursue the old practice of grinding ear corn, but this is not considered as good a feed as it was in former years, as hogs will not eat the chop which contains corn cobs unless they are ground very fine. I do not want to lead you to believe that our millers in Pennsylvania are perfect, but they are doing a business that is nearer the honest dealer than they did in the past. Our great supply of commercial feeds comes from Ohio, Illinois, Indiana, Wisconsin, Minnesota, Kansas and other Western states. Each has a by-product to sell. As we are the great market for feeds, they are all busy looking after their interests, and in this, I do not blame them, if they will give our farmers and stock feeders the worth of their money. The business of the Department of Agriculture, through its Secretary and his agents, is to see that this is done. The feeds sold in Pennsylvania showed a marked improvement.

As stated in my previous report, *I am still advocating the doctrine that all feeds should be sold on their protein and fat value and their low fiber constituency, or the higher the protein and fat and the lower the crude fiber, the more valuable the feed.*

Gentlemen, it is time for you to STOP, THINK and CONSIDER the great question of purchasing your feed supply on the basis that I have laid down to you. For your information, and that it may be convenient for you to refer to when you receive this report printed in the proceedings of this meeting, I have compiled the following table:

TABLE OF ANALYSIS.

Name of Feeding Stuff.	Crude Protein.	Crude Fat.	Crude Fiber.
	Per cent.	Per cent.	Per cent.
Corn, ...	10.40	5.00	2.00
Hominy chop or feed, ...	9.80	8.80	2.80
Gluten meal, ...	29.30	11.30	3.30
Gluten feed, ...	24.00	10.60	5.30
Dried distillers' grain, largely from corn, ...	30.80	13.30	12.00
Oats, ...	11.80	5.00	9.50
Oats shorts, ...	16.00	7.10	6.10
Wheat, ...	11.90	2.10	1.80
Wheat bran, ...	15.40	4.00	9.00
Wheat middlings, ...	15.60	4.00	4.80
Wheat shorts, ...	14.90	4.50	7.40
Barley, ...	12.40	1.80	2.70
Barley meal, ...	10.50	2.80	6.50
Brewers' grain, dry, ...	26.00	5.60	1.40
Malt sprouts, ...	27.20	2.00	13.00
Rye, ...	10.60	1.70	1.70
Rye bran, ...	14.70	2.80	3.50
Buckwheat, ...	10.00	2.20	8.70
Buckwheat bran, ...	12.40	3.50	*31.90
Buckwheat middlings, ...	28.90	7.10	4.10
Buckwheat shorts, ...	27.10	7.60	8.30
Cottonseed, ...	18.40	19.90	23.20
Cottonseed meal, ...	42.30	13.10	15.60
Flaxseed, ...	22.60	33.70	7.10
Linseed meal, O. P., ...	32.90	7.90	8.90
Linseed meal, N. P., ...	33.20	8.00	9.50
Corn silage, ...	1.07	0.80	6.00
Alfalfa hay meal, ...	14.3	2.20	26.33

*Note high per cent. †No hulls.

This table gives you the analysis of the cereals as nature produces them. It also gives you the analysis of the by-product as the chemists find them, and I hope that this table may aid you in becoming educated in regard to the feeds that go to make up the concentrated pure feeds that are on the market.

I am often asked the question, "What is the analysis of the adulterants that are mixed with the feeds that are found on our markets?" I will give you a table of the adulterants that we have found on the markets of Pennsylvania:

Name of Adulterant.	Crude Protein.	Crude Fat.	Crude Fiber.
	Per cent.	Per cent.	Per cent.
Corn cobs, ground, ...	2.40	0.50	30.83
Oat hulls, ...	3.00	1.00	29.33
Buckwheat hulls, ...	4.60	1.10	43.30

By referring to the law, you will find that corn cobs can only be mixed with corn products, such as corn meal, hominy and gluten. In our work for the year, we have not found any corn cobs mixed with gluten. We have found one firm mixing corn cobs with hominy feed and another firm manufactures a feed, using corn on the ear and hominy, but the fiber in this feed has been kept at about 10 per cent. as the law requires, except in two samples, and in these cases your Secretary ordered prosecution. We secured conviction in both cases and the fine of \$50.00 and costs were paid, which were covered into the State Treasury.

Oat hulls are a common mixture with feed, but the law says that if used, they must be so stated in the composition, and that the fiber content of said feed shall not exceed more than 9 per cent. with a variation of 10 per cent. of the 9 per cent. which would make 9.90 per cent. We have had some trouble with the manufacturers who are using oat hulls in a mixture, to keep their fiber near the amount stated. They claimed that they had old goods on the market of Pennsylvania, and that we had secured samples of this. They also claimed that they had trouble in mixing their goods to comply with the law. After a few prosecutions were brought, this firm placed on our markets feeds that now comply with the law. One firm indicated that they were going to withdraw their goods from our markets, and this is a matter which they will have to decide for themselves.

The great trouble during the year that we have had to contend with, has been the molasses feeds that were found upon the markets of Pennsylvania. The law prohibits the mixing of weed seeds with any feeds sold in our State. A number of manufacturers of molasses feeds persisted in mixing all kinds of weed seeds in their feeds. Their attention was called to these violations, but they still continued to mix weed seeds with their feeds. The Secretary directed prosecution against the said firms, and we have secured conviction in each case, and we believe that we will be able by constantly looking after the matter to prohibit the mixing of weed seeds with any concentrated commercial feeds sold in our State. We think it is time that some of the Eastern states that are consumers of feeds as we are, would endeavor to have passed a law similar to our own. The Pure Food Law protects the human race, and we as men should protect the animals that cannot say what they will eat, but have to eat what is given them or do without. There should be more education on this subject. Six years ago, there was very little known about the analysis of feeds, in fact, very few knew what protein and fat were, and it was only four years ago that we had written in the law, directing the manufacturer should give the analysis for fiber. The question came up at once, What had fiber to do with the foods? But you are all coming to find out.

I do not wish to criticize any of the educational departments of our State, but I was very sorry to see that at the last Farmers' Week at State college, there was not one person on the program to give any instruction on commercial feeds, and in looking over the list of lecturers at Farmers' Institutes I can only find one who was scheduled to talk on this great subject. I believe the question is important enough to the farmers and dairymen of Pennsylvania that have some one on each section of the Farmers' Institute force that could or

would talk on commercial feeds as they are found in Pennsylvania. You will find a large number of instructors who are able to tell you all about fertilizers and other subjects.

By the last information that was secured in the Department of Agriculture in regard to the amount of fertilizers sold in the State, it was estimated between six and seven millions of dollars worth, and after consulting with men who I believe know, I am safe in saying there are more than thirty millions of dollars worth of concentrated commercial feeding stuffs sold in Pennsylvania during 1910. This will give some idea of the importance of this subject.

I hereby give you a table that gives the names of the county, town or city visited, number of samples taken in each town, number of samples taken in each county and number of towns visited where no samples were taken.

This table shows that there were 1500 samples taken by our Special Agent in 1910. It also shows the number of towns that were visited in which there were no samples taken. The reason that there were no samples taken in these towns, was that the feed on sale had been sampled in other towns near by. We could not visit near all the feed stores in each county, as it would have consumed all the time of the agent, and it would have been impossible to visit all the counties of the Commonwealth. This matter will be referred to under the head of "Our Needs."

TABULATED STATEMENT.

Name of County Visited.	Name of Town or City Visited.	Number of samples taken in each town.	Number of samples taken in county.
Indiana, ...	1. Blairsville, ...	8	
	2. Saltsburg, ...	5	
	3. Blacklick, ...	0	
	4. Homer City, ...	7	
	5. Indiana, ...	8	
	6. Ernest, ...	0	
	7. Clymer, ...	0	
	8. Creekside, ...	0	28
Cambria, ...	1. Patton, ...	5	
	2. Hastings, ...	2	
	3. Barnesboro, ...	3	
	4. Carrolltown, ...	2	
	5. Ebensburg, ...	1	
	6. Johnstown, ...	17	
	7. South Fork, ...	0	
	8. Gallitzin, ...	0	
	9. Scalplevel, ...	0	
	10. Conemaugh, ...	0	
	11. Cresson, ...	3	33
Susquehanna, ...	1. Montrose, ...	9	
	2. Alford, ...	1	
	3. New Milford, ...	7	
	4. Great Bend, ...	3	
	5. Susquehanna, ...	10	
	6. Lanesboro, ...	2	
	7. Oakland, ...	0	
	8. Hallstead, ...	0	32

NOTE: No samples were taken in some towns, where indicated, from the fact that the feed found had been sampled.

TABULATED STATEMENT—Continued.

Name of County Visited.	Name of Town or City Visited.	Number of samples taken in each town.	Number of samples taken in county.
Bradford, ...	1. Towanda, ...	4	
	2. Ulster, ...	8	
	3. Monroeton, ...	4	
	4. Towanda, R. F. D. No. 3, ...	3	
	5. Athens, ...	3	
	6. Sayre, ...	4	
	7. Troy, ...	6	
	8. Alba, ...	6	
	9. Canton, ...	8	
	10. South Waverly, ...	0	
	11. Milan, ...	0	41
Bedford, ...	1. Everett, ...	1	
	2. Bedford, ...	14	15
Bucks, ...	1. Quakertown, ...	2	
	2. Richland Centre, ...	4	
	3. Doylestown, ...	9	
	4. Chalfont, ...	0	
	5. Lansdale, ...	0	
	6. Colmer, ...	0	
Tioga, ...	1. Wellsboro, ...	16	
	2. Westfield, ...	7	
	3. Elkland, ...	3	
	4. Knoxville, ...	8	
	5. Osceola, ...	0	
	6. Cownesque, ...	0	34
Potter, ...	1. Coudersport, ...	13	
	2. Ulysses, ...	0	13
McKean, ...	1. Port Allegany, ...	8	
	2. Kane, ...	9	
	3. Bradford, ...	16	
	4. Mt. Jewett, ...	0	
	5. Eldred, ...	0	
Cameron, ...	1. Emporium, ...	10	
	2. Driftwood, ...	0	10
Elk, ...	1. Ridgway, ...	8	
	2. St. Marys, ...	8	
	3. Johnsonburg, ...	3	
Warren, ...	1. Warren, ...	10	
	2. Youngsville, ...	3	13
Westmoreland, ...	1. Derry, ...	1	
	2. Latrobe, ...	3	
	3. Greensburg, ...	16	
	4. Irwin, ...	8	
	5. Jeannette, ...	9	
	6. Manor, ...	0	
	7. Mount Pleasant, ...	8	
	8. Scottdale, ...	5	
	9. Belle Vernon, ...	2	
	10. New Kensington, ...	4	
	11. Parnassus, ...	0	
	12. Monessen, ...	2	61
Fayette, ...	1. Uniontown, ...	13	
	2. Connellsville, ...	0	
	3. Belle Vernon, ...	1	14

NOTE: No samples were taken in some towns, where indicated, from the fact that the feed found had been sampled.

TABULATED STATEMENT—Continued.

Name of County Visited.	Name of Town or City Visited.	Number of samples taken in each town.	Number of samples taken in county.
Allegheny.	1. McKeesport,	5	53
	2. Pittsburgh,	10	
	3. Wilkensburg,	8	
	4. Carnegie,	12	
	5. Wilmerding,	5	
	6. Pitcairn,	3	
	7. Braddock,	10	
Washington.	1. Monongahela,	7	45
	2. Charleroi,	6	
	3. Washington,	18	
	4. Canonsburg,	14	
	5. Houston,	0	
Greene,	1. Waynesburg,	5	5
Armstrong,	1. Apollo,	4	29
	2. Vandergrift,	3	
	3. Leechburg,	5	
	4. Kittanning,	14	
	5. Ford City,	1	
	6. Manorville,	2	
Beaver,	1. New Brighton,	8	13
	2. Beaver,	1	
	3. West Bridgewater,	1	
	4. Monaca,	3	
	5. Beaver Falls,	0	
Lancaster.	1. Lancaster,	23	85
	2. Lititz,	9	
	3. Leaman Place,	6	
	4. Manheim,	8	
	5. Kinzer,	5	
	6. Ephrata,	2	
	7. Columbia,	6	
	8. Elizabethtown,	14	
	9. Christiana,	4	
	10. Witmer,	3	
	11. Bird-in-hand,	3	
	12. Paradise,	0	
	13. Gap,	0	
	14. Ronk,	0	
	15. Strasburg,	0	
	16. Mt. Joy,	0	
York,	1. York,	32	14
	2. Hanover,	12	
Chester.	1. Coatesville,	8	30
	2. Parkesburg,	6	
	3. Downingtown,	4	
	4. Mortonville,	2	
	5. Modena,	0	
	6. West Chester,	15	
	7. Kennett Square,	4	
	8. Westgrove,	0	
	9. Phoenixville,	0	
Mifflin,	1. Lewistown,	10	12
	2. McVeytown,	2	
	3. Reidsville,	0	
Juniata,	1. Port Royal,	2	5
	2. Mifflin,	3	

NOTE: No samples were taken in some towns, where indicated, from the fact that the feed found had been sampled.

TABULATED STATEMENT—Continued.

Name of County Visited.	Name of Town or City Visited.	Number of samples taken in each town.	Number of samples taken in county.
Jefferson.	1. Lindsey, ...	3	
	2. Punxsutawney, ...	3	
	3. Reynoldsville, ...	4	
	4. Brookville, ...	4	14
Lycoming.	1. Williamsport, ...	19	
	2. Newberry, ...	5	
	3. Montoursville, ...	8	
	4. Williamsport, R. F. D. 1, ...	3	
	5. Muncy, ...	0	30
Clinton.	1. Lock Haven, ...	8	
	2. Flemington, ...	2	
	3. Renovo, ...	7	
	4. Millhall, ...	0	17
Centre.	1. Bellefonte, ...	4	
	2. Philipsburg, ...	18	22
Adams.	1. Gettysburg, ...	5	5
Franklin.	1. Waynesboro, ...	55	
	2. Greencastle, ...	2	
	3. Chambersburg, ...	12	
	4. Scotland, ...	7	
Cumberland.	1. Shippensburg, ...	8	
	2. Newville, ...	8	
	3. Carlisle, ...	10	
	4. Mt. Holly Springs, ...	8	
	5. Mechanicsburg, ...	6	40
Dauphin.	1. Harrisburg, ...	19	
	2. Middletown, ...	4	
	3. Steelton, ...	3	26
Lebanon.	1. Lebanon, ...	13	
	2. Myerstown, ...	17	
	3. Annville, ...	0	30
Berks.	1. Reading, ...	36	
	2. Mt. Penn., ...	1	
	3. Kutztown, ...	5	
	4. Fleetwood, ...	3	
	5. Birdsboro, ...	0	
	6. Boyertown, ...	0	
	7. Lyons, ...	0	
Lehigh.	1. Allentown, ...	37	
Huntingdon.	1. Huntingdon, ...	8	
	2. Mapleton, ...	7	
	3. Mt. Union, ...	8	
	4. Petersburg, ...	0	23
Blair.	1. Altoona, ...	59	
	2. Martinsburg, ...	14	
	3. Hollidaysburg, ...	5	
	4. Tyrone, ...	9	
	5. Juniata, ...	0	
	6. Bellwood, ...	0	
	7. Duncansville, ...	0	87
Clearfield.	1. Munson Station, ...	8	
	2. Osceola Mills, ...	3	
	3. Du Bois, ...	12	
	4. Clearfield, ...	8	
	5. Wallacetown, ...	5	
	6. Houtzdale, ...	0	
	7. Morrisdale, ...	0	
	8. Winburn, ...	0	36

NOTE. No samples were taken in some towns, where indicated, from the fact that the feed found had been sampled.

TABULATED STATEMENT—Continued.

Name of County Visited.	Name of Town or City Visited.	Number of samples taken in each town.	Number of samples taken in county.
Northumberland, -----	1. Sunbury, -----	16	
	2. Shamokin, -----	5	
	3. Mt. Carmel, -----	5	
	4. Milton, -----	19	
	5. Watsonstown, -----	8	46
Union, -----	1. Lewisburg, -----	11	
	2. Mifflinburg, -----	2	13
Snyder, -----	1. Selinsgrove, -----	8	8
Montour, -----	1. Danville, -----	17	17
Columbia, -----	1. Bloomsburg, -----	11	
	2. Catawissa, -----	8	
	3. Berwick, -----	5	24
Perry, -----	1. Marysville, -----	2	
	2. Duncannon, -----	5	7
Luzerne, -----	1. Wilkes-Barre, -----	35	
	2. Hazleton, -----	9	
	3. Nanticoke, -----	8	
	5. Edwardsville, -----	0	
	6. Kingston, -----	0	
	7. Luzerne, -----	0	
	8. Pittston, -----	0	50
Lackawanna, -----	1. Scranton, -----	28	
	2. Dunmore, -----	0	28
Butler, -----	1. Butler, -----	20	
	2. Harmony, -----	8	
	3. Zellenople, -----	0	
	4. Evans City, -----	0	28
Mercer, -----	1. Mercer, -----	7	
	2. Greenville, -----	4	
	3. Sharon, -----	8	
	4. South Sharon, -----	3	
	5. Sharpsville, -----	2	24
Lawrence, -----	1. New Castle, -----	8	8
Venango, -----	1. Oil City, -----	16	
	2. Franklin, -----	3	
	3. Emlenton, -----	4	23
Forest, -----	1. Tionesta, -----	8	8
Crawford, -----	1. Titusville, -----	8	
	2. Utica, -----	0	
	3. Cochranton, -----	0	8
Erie, -----	1. Corry, -----	4	
	2. Union City, -----	10	
	3. Erie, -----	12	26
Montgomery, -----	1. Pottstown, -----	18	
	2. Pottstown, R. F. D. No. 1 (Sanatoga), -----	5	23
Delaware, -----	1. Chester, -----	12	12
Philadelphia, -----	1. Philadelphia, -----	1	1
Somerset, -----	1. Windber, -----	4	
	2. Somerset, -----	10	
	3. Rockwood, -----	1	15
	4. Plymouth, -----	0	

NOTE: No samples were taken in some towns, where indicated, from the fact that the feed found had been sampled.

I also hereby submit a table showing the places from which the samples were sent in, under that section of the law which says that any resident of Pennsylvania can forward to the Department a sample of feeding stuffs, enclosing a fee of one dollar for the analysis of the same. The said analysis shall be made within fifteen days upon receipt of sample at the Laboratory. This table will give you some idea of the interest that is taken by the purchasers of feed throughout the Commonwealth:

SPECIAL SAMPLES RECEIVED FOR ANALYSIS DURING THE YEAR 1910.

Name of County.	Name of Town.	Number of samples received.	Number of samples received from each county.
Allegheny, -----	1. Pittsburg, -----	12	
	2. Allegheny, -----	1	
	3. Large, -----	1	
	4. Cheswick, -----	1	15
Armstrong, -----	1. Apollo, -----	1	1
Beaver, -----	1. New Brighton, -----	5	5
Bedford, -----	1. Saxton, -----	1	1
Berks, -----	1. Reading, -----	6	
	2. Kutztown, -----	4	10
Blair, -----	1. Altoona, -----	5	5
Bradford, -----	1. Rome, -----	1	
	2. Towanda, -----	2	
	3. Sayre, -----	1	1
Bucks, -----	1. Benjamin, -----	1	
	2. Pipersville, -----	1	
	3. Newtown, -----	3	
	4. Quakertown, -----	1	6
Butler, -----	1. Butler, -----	6	6
Cambria, -----	1. Johnstown, -----	4	4
Centre, -----	1. Center Hall, -----	1	1
Chester, -----	1. Coatesville, -----	2	
	2. Chatham, -----	1	
	3. Lincoln University, -----	1	
	4. Malvern, -----	1	
	5. Parkesburg, -----	5	
	6. Phoenixville, -----	1	
	7. West Chester, -----	1	
Clearfield, -----	1. Coalport, -----	1	
	2. Du Bois, -----		
Columbia, -----	1. Berwick, -----		1 casein.
	2. Fishing Creek, -----		
Crawford, -----	1. Meadville, -----		in the markets
Dauphin, -----	1. Harrisburg, -----		own in our mar-
	2. Highspire, -----		tons sold. They
Delaware, -----	1. Camp Ground, -----		ugh the West and
	2. Chester, -----		
	3. Sharon Hill, -----		

SPECIAL SAMPLES RECEIVED FOR ANALYSIS DURING THE YEAR 1910.

—Continued.

Name of County.	Name of Town.	Number of samples received.	Number of samples received from each county.
Erie, ...	1. Erie, ...	2	
	2. Waterford, ...	1	3
Franklin, ...	1. Chambersburg, ...	4	4
Juniata, ...	1. Mifflin, ...	2	
	2. Port Royal, ...	1	3
Lackawanna, ...	1. Scranton, ...	2	2
Lancaster, ...	1. Christiana, ...	2	
	2. Columbia, ...	3	
	3. Drumore, ...	1	
	4. East End, ...	1	
	5. Elizabethtown, ...	4	
	6. Lancaster, ...	5	
	7. Lititz, ...	4	
	8. Manheim, ...	1	
	9. New Providence, ...	1	
	10. Quarryville, ...	1	
	11. Vintage, ...	1	24
Lawrence, ...	1. New Castle, ...	1	1
Lebanon, ...	1. Palmyra, ...	1	1
Lehigh, ...	1. Allentown, ...	1	1
Luzerne, ...	1. Wilkes-Barre, ...	6	6
Lycoming, ...	1. Montoursville, ...	3	3
Mifflin, ...	1. Lewistown, ...	1	1
Monroe, ...	1. Pocono, ...	3	3
Montgomery, ...	1. Collegeville, ...	1	
	2. Conshohocken, ...	1	
	3. Landsdale, ...	2	
	4. Linfield, ...	1	
	5. Narcessa, ...	1	
	6. Pottstown, ...	1	
	7. Schewnkville, ...	1	8
Northampton, ...	1. Portland, ...	1	1
Northumberland, ...	1. Shamokin, ...	1	
	2. Sunbury, ...	4	5
Philadelphia, ...	1. Philadelphia, ...	47	47
Potter, ...	1. Galetton, ...	1	1
Somerset, ...	1. Friedens, ...	1	1
Yanina, ...	1. Herrick Center, ...	1	
Montgomery, ...	2. Lanesboro, ...	1	
	3. Montrose, ...	3	5
Delaware, ...	1. Lawrenceville, ...	2	
	2. Wellsboro, ...	3	5
Philadelphia, ...	1. Mifflinburg, ...	2	2
Somerset, ...	1. Sugargrove, ...	1	1
	1. Canonsburg, ...	2	
	2. Elrama, ...	1	3

NOTE: No samples were found had been sampled.

SPECIAL SAMPLES RECEIVED FOR ANALYSIS DURING THE YEAR 1910.

—Continued.

Name of County.	Name of Town.	Number of samples received.	Number of samples received from each county.
Wayne, ...	1. Mawley, ...	1	1
Westmoreland, ...	1. Gibsonton, ...	3	2
	2. Greensburg, ...	1	
	3. Manor, ...	1	
	4. Scottdale, ...	1	5
York, ...	1. Brodbeck's, ...	1	
	2. York, ...	1	2

We find upon the markets of Pennsylvania a number of brands of what is known as calf meal. This meal is compounded to be used in the raising of young calves where there is a scarcity of nature's feed of pure milk. The firms that are manufacturing these goods are making a legitimate feed, and we have failed to find any adulteration in the same, and in reports that have been received from farmers who are using the calf meals, we find that they are favorable to their use.

I here give a table which will give the analysis of three of the leading brands of this meal:

No. 1—

Protein, 27 per cent.
Fat, 5 per cent.
Fiber, 5 per cent.

Composition: Locust bean meal, wheat flour, flaxseed, cottonseed meal, beans, peas and lentils.

No. 2—

Protein, 27 per cent.
Fat, 7 per cent.
Fiber, 5 per cent.

Composition: Oat meal, barley, linseed and cottonseed meal.

No. 3—

Protein, 20 per cent.
Fat, 9 per cent.
Fiber, 3 per cent.

Composition: Oat meal, wheat meal, ground flaxseed and casein.

There is a large amount of chicken feed sold upon the markets of Pennsylvania. A few years ago they were not known in our markets, but at the present time there are thousand of tons sold. They are compounded by reputable manufacturers through the West and

by a number of firms in our own State. These feeds are sold to the consumer at an average of about $2\frac{1}{2}$ cents per pound. In some localities, they run a little less and in other sections, they retail at 3 cents per pound, or they retail at \$45 to \$60 per ton. I have prepared a table showing what these different ingredients would cost per hundred pounds.

Wheat, ...	\$1.60
Oats, ...	1.20
Buckwheat, ...	1.20
Barley, ...	1.10
Kaffir Corn, ...	2.00
Millet, ...	2.10
Corn, ...	1.50
\$10.70	

Dividing this by the seven cereals of which it is composed, we find that they cost on an average of one dollar and fifty cents a hundred or $1\frac{1}{2}$ cents per pound or \$30 per ton. The cost of these cereals compared with that of the different scratch grains that we find shows a large profit to the mixer or compounder of the same. Of course, there is one reason that might be given for this difference in cost and that is the profit that must go to the wholesaler also the profit that must go to the jobber. This table consists of the price of the feeds as they are on the market today, but there is one way that the manufacturer of the scratch grains can reduce his mixture and that is by mixing wheat screenings with the same. The larger percentage of the scratch grains that are found upon the market are made up of wheat screenings. I am not condemning the scratch grain as a feed. I am only calling your attention to the difference in price between that which can be mixed by poultryman or farmer and those that are bought in the convenient way from the dealer.

A few years ago, the Department brought prosecution against a number of firms that were manufacturing chicken feed or scratch grain which contained a large percentage of weed seeds, but after our new law went into effect, these have been eliminated to a large extent and the chick feeds that have been found upon the market, with but few exceptions, comply with the Feeding Stuff Law of Pennsylvania.

There are a number of inquiries come to the Department in regard to condimentals that are found upon our markets. These condimentals known as invigorators and blood purifiers, are all sold on the market as feeds for domestic animals. In analyzing a number of these preparations, we find that they contain drugs that can be purchased in any drug store, and if our farmers and dairymen will secure Bulletin 175, pages 147, 148 and 149, they will find the formula or composition of these different condimentals.

I find that the farmers and poultry feeders are always more anxious to get something to feed in a convenient form, which they pay from 100 to 200 per cent. more for, than if they purchased the materials and compound it themselves. This seems to be the natural way of doing things at the present time. We would all sooner have other people to do this work in a wholesale way than to be bothered with it ourselves, but that is a matter for each individual to decide.

The question is often asked, What are distillers' and brewers' grains or by-products. I here give a definition of the same taken from Bulletin No. 175 for the year 1908. This may be of some information to those purchasing feeds, and as it is in a condensed form, it may be of more value than if a full definition were given.

DISTILLERY AND BREWERY BY-PRODUCTS.

Distillers' Grains

Analyses on pages 58 and 59, Bulletin No. 175.
1908.

Distillers' grains are obtained from the cereals in the manufacture of alcohol or whiskey. Usually corn and rye are used, but sometimes, we find that oats, wheat or barley are employed. Briefly, the process is as follows:

The grains are coarsely ground and treated with a malt solution which converts the starch into sugar. Yeast is then added, thus changing the sugar into alcohol, which can be distilled. The residue, consisting chiefly of the protein, germs and hulls of the grains used, is dried and sold as food for cattle. Distillers' dried grains, having all the starch removed, is consequently richer in protein and fat than the grains from which they are derived. These grains are considered valuable and economical food for dairy animals.

Three samples of corn distillers' grains were analyzed, showing an average of 33.69 per cent. of crude protein, 15.24 per cent. of crude fat and 12.17 per cent. of crude fiber. The collection also included one sample of rye distillers' grains which carried less than one-half as much crude protein than was found in corn distillers' grains. The sample also carried nearly three per cent. more crude fiber.

BREWERS' GRAINS.

Analyses on pages 58 and 59, Bulletin No. 175.

Brewers' grains are obtained from barley in the manufacture of malt liquors. The barley is first placed under conditions favorable to germination, and during this process, the starch is converted into sugar. The sprouts are removed and sold as cattle food while the malted grains are crushed, the sugar is extracted, and the residue is dried and placed upon the market as brewers' dried grains. Distillers' and brewers' grains are fairly digestible. Four samples were analyzed during 1908 and the average results appear in the following table:

AVERAGE ANALYSES AND RETAIL PRICES.

Number of samples, ...	1	1	6	4
Crude protein, ...	28.50	22.50	26.34	28.19
Crude fat, ...	7.27	6.93	7.30	7.43
Crude fiber, ...			13.25	14.13
Price, per ton.	\$20.00	\$23.00	\$22.80	\$28.25

The number of violations of the Feeding Stuff Law was sixty. We have secured convictions in all of these cases but one, and that case has been appealed to court and will be tried at the March term in the Centre County Court. In the hearings of these cases before the courts, there never has come up a question in the argument of the attorneys for the defense in regard to the constitutionality of the law, and I am led to believe, from the information I received from the attorneys, that our law is a good one and well drawn. The Secretary has been very anxious that our law should not be the means of prosecution, that we should endeavor to educate and inform the manufacturers of concentrated feeds of the meaning of the law and have them comply with the law without bringing more prosecutions than is necessary. The men who are engaged in the sale of feeds throughout Pennsylvania are reputable citizens, engaged in legitimate business, and our experience with them is that they are anxious to handle pure feed and give their customers a fair return for their money.

I would like to call your attention to one instance where a large firm in the West, that for years handled large quantities of mixed feeds, that have placed upon the market feed running very high in protein, high in fat and low in fiber, and they are endeavoring to have their customers buy this feed. They claim that it is more profitable to buy a feed high in protein and fat and low in fiber than to buy the low grade feeds that were formerly on the market.

There is another section of this law that we are pleased to state the manufacturers or importers of feeding stuffs are complying with. and that is, that upon the request of the Department they shall file a registration, giving the analysis and composition of their feeds. We have received 378 registrations for the sale of commercial feeds in Pennsylvania, representing over 1200 brands. Many brands were alike in their composition, such as wheat by-products, distillers' and brewers' by-products and whole grain feeds.

OUR NEEDS.

I would like to call your attention to some of our needs for the proper enforcement of this law. The work has so grown and the large number of feed products placed upon our markets has become enormous, and it is impossible for one sampling agent to visit all the feeding stuff stores in Pennsylvania once a year, and we find that a visit should be made at least twice a year to each dealer, if possible. Therefore, we need money to employ one more sampling agent.

We also need in the office one clerk who should be a stenographer and also able to keep books, as each sample that is taken by the agent means just a given amount of work in the office. There must be records kept of these samples, and after they are analyzed, reports of the analysis must be made to the Secretary, to the dealer,

to the manufacturer, and one to be kept on file in the office. Thus you will see that 2,000 samples taken, means eight to ten thousand reports to be made of each sample. We also sent out 6500 bulletins and a large number of copies of the law. This all requires clerical work besides the thousands of letters that come to the Department requiring answers. We have grown from a very small beginning to a Bureau of no small means. I have endeavored in the short space of time that has been allotted to me, to call your attention to some of the most important things connected with our work.

We have here at the meeting samples of the different feeds that we find on the markets of Pennsylvania, as well as samples of the adulterants. You will find a gentleman in charge of the same, and we will be pleased to give you any information that it is in our power to give. The Laboratory is situated on the fifth floor of the Capitol Building, and you will find those in charge delighted to give you any information that they can.

As the General Agent of the Department of Agriculture, I wish to return thanks to Secretary Critchfield for his courtesy and kindness to me and for the confidence that he has reposed in me in carrying out his work.

I also wish to thank the Chief Chemist, Mr. James W. Kellogg, for his kindness and for the able manner in which he has had conducted the laboratory work, and to Mr. John F. St. Clair, the Special Agent, for the care and courteous manner which he has met the dealers throughout the State of Pennsylvania.

Any information that I can give to any member of this Board or any farmer in Pennsylvania, in regard to commercial feeds, I will be delighted to do it. You will find our bulletin covering the work of 1909, one of the best published in the United States.

MR. HUTCHISON: The most important statement in my report is: "I am still advocating the doctrine that all feeds should be sold on their protein and fat value, and their low fiber constituency, or the higher the protein and fat and the lower the crude fiber the more valuable the feed." If you get nothing else out of my report, I would like you to make that statement.

A Member: I would like to know the analysis of corn silage.

MR. HUTCHISON: 1.07 per cent of protein, .80 per cent of fat and 6 per cent. of crude fiber. It is low, as you see, in protein, and low in fat, but the great value of the ensilage is that in the green state it makes a stimulating food in the winter. Of course, lots of good feeders add some high protein feed with the ensilage to bring it up. Is there any other analysis that you would like to have?

A Member: Let us have the alfalfa, please.

MR. HUTCHISON: The alfalfa hay meal is 14.3 per cent. of protein—some will run a little higher than that; crude fat, 2.20 per cent. Now there is a difference in the fiber of alfalfa running according to the large stems which you will find in the plants; some of it runs a little higher and some lower, but the average is about 25 per cent. of fiber.

A Member: Please compare the wheat bran right there.

MR. HUTCHISON: Wheat bran is fifteen, that is a little higher, in round numbers, in protein; 4 per cent. of crude fat compared with 2.20 per cent; and nine per cent. of fiber. The wheat bran has less fiber than the alfalfa. The report that I get from the men who manufacture the alfalfa meal is that we have to add corn or something with it to bring it up. Just feeding alfalfa alone the dairymen don't get the best results.

MR. J. A. HERR: Mr. Chairman, I move that the report be received and placed on file for publication with the proceedings of the Board.

The motion was seconded and agreed to.

The **CHAIRMAN:** Is there any further discussion on either of the reports read this morning.

MR. GLOVER: I would like to ask a question in regard to roads, for information. Whether the roads that were contracted for two or three years ago will probably be completed now? Up in our county of Union there was a road started from Mifflin to Lewisburg, a distance of about nine miles, and after they had built about three miles the work stopped. Our people would like to know whether this road will be completed now. The contractor seems ready to go on with the work, but there appears to be a hitch somewhere here at the Highway Department.

The **CHAIRMAN:** Is there any one here who can answer that question? Perhaps no one but the Highway Commissioner can answer it.

MR. HUTCHISON: We have had the same experience, and hundreds and hundreds of others have had it throughout the Commonwealth. The appropriation of money made was not large enough to complete this work. Now our county has a peculiar condition. We have surveys made for four and a half miles of road out of Tyrone through our valley. The survey was made, it passed our County Commissioners, and passed up to the high officials, and we thought we were going to drive on a State road, but our good brothers in Huntingdon, under the little amendment that was put into the State law afterwards saying that boroughs could get the appropriation to build roads, came down here and put us in a hole, and Huntingdon borough got the forty-four thousand dollars to build roads in Huntingdon borough for farmers to hitch their horses on, and gentlemen to run their automobiles on, and that has been a great detriment to the good road laws of Pennsylvania. I just think it is something we should consider and think about, and if the new road law comes here let us see that it provides that the boroughs shall build their own streets. When these two fellows built the roads they don't even leave the hitching posts up for the farmers to tie their horses on. This has been a detriment to getting money to build roads, and that is why ours is not completed. I would like to go on record here as a member of this Board, and one interested in the farmers of Pennsylvania, against the boroughs getting the money that should go to the farmers to build roads.

The CHAIRMAN: Are there any other questions on the subject gone over? We want to have the discussions now. We have some time for this.

MR. WITTMAN: I might add another thing to what Mr. Hutchison says in his report. He says something about people paying too much for scratch feed for chickens. They are also loosing a lot of money, because the grains used generally in making up these compound feeds are shrivelled up and far from being first class grains, and people paying more than the prices of the good grain are paying too much for this inferior stuff. The hens cannot lay eggs on stuff like that. It is all husks and fiber. The analysis shows that it is not a good feed to get results. I ran across a man who was feeding this commercial feed and he says you see the way I am feeding, and they will not lay. That fellow had a half an inch of that feed in the pen. It was all waste stuff. They would not eat it. They could not lay eggs. It was up to me and I told him to buy the grains himself and get the best, and feed that, and in a few weeks he was getting lots of eggs. He had been feeding this other feed for two months and getting nothing, and besides was paying too much for his wisdom.

MR. HUTCHISON: A little discussion of that scratch grain now may save some money.

The SECRETARY: I should be very glad if it would be scratched clear.

MR. WITTMAN: Mr. Hutchison does not make it strong enough. He says there are thousands of tons sold in Pennsylvania, where ten years ago there were practically none. That is not big enough. There are thousands of tons sold in southeastern Pennsylvania. It is almost universally used. People don't seem to know of anything else because it is handy and ready mixed. The farmer seems to think it is too much trouble to mix his own feed.

In one way the law is wrong. On the other hand, I send to St. Louis and buy a particular brand of chicken feed just because it contains a lot of weed seeds. My chickens are weed seed hungry all winter and I get more eggs because I feed weed seeds. You take the droppings and mix them up and pour on blotting paper, and examine them and see what happens. These weed seeds are just ground up fine. They don't do any harm. My hen manure does not give me any weeds on my lawn.

MR. HUTCHISON: Go on and state that the chicken and sheep are the only two animals that have the means of grinding up these weed seeds.

MR. WITTMAN: That is what the Vermont Station says. The chicken that has plenty of grit grinds up all of the weed seeds.

A Member: Why do you buy that weed seeds?

MR. WITTMAN: It is a cheap feed I am buying. I buy it because the man does not make any secret that it does contain a lot of weed seeds, and because my chickens like it and it is good, and they are hungry for it all winter long.

The SECRETARY: You are not selling any of it?

MR. WITTMAN: No; I am buying it all winter long. I think the law is wrong in that respect. I think weed seeds ought to be allowed in chicken feed.

MR. HUTCHISON: Will they eat cockel?

MR. WITTMAN: No, there are three weed seeds they won't eat.

A Member: What are the cheap feeds that chickens would eat?

MR. WITTMAN: Low grade of oats, a poor grade of barley, three or four kinds of wheat, screenings, just simply a lot of husk and fiber and poor cheap buckwheat. It is the poorest kind of grain that is what it is.

A Member: Some of the wheat in our county is smutty. How would that do to feed chickens?

MR. WITTMAN: They would pick out the good wheat first. When forced they will eat the others and it causes a lot of damage.

MR. HUTCHISON: I am glad Brother Wittman came up on that. Now, under the Secretary's ruling, screenings are the small grains or broken grains of wheat, rye, buckwheat and things of that kind, that are not wheat seeds. He has been buying small grains of wheat and oats, and small grains of other cereals. That part is all right but now he is buying up weed seeds on the market. He is buying a large amount of cockel that they will not eat. There are other weed seeds that the chicken can assimilate. They are high in protein, though bitter, yet they like them when ground up as they grind them they get the benefit, that is the two domestic animals mentioned. I was talking on the cheapness of the feed and the fraud the man is paying for. That is what I was bearing down on. I am glad to have this discussion. That is what will sharpen us on that line.

I would like you to say something about this calf meal. Have you any experience on that? Let us have somebody talk on this and get something out of it. Unless there is something else to come up I would like to hear something on this subject. This calf feed is a new thing to me. I have had trouble more or less with calves and have given them milk for a long time, and this is a new feed to me entirely.

My experience is that the best grain, that weighs the most is the cheapest and will pay. The warehouse people are asking seventy-five cents for common screenings. You cannot afford to pay that for it when good wheat is only ninety cents a bushel. I am sure there is not over sixty per cent. of food value in the screenings compared with good wheat, so I say the best grain is the cheapest.

A Member: Mr. Chairman, I have in the past eight years fed calf meal at different times, and I have always found it a very good help when milk was short. It does well, the calves thrive.

On the road question I want to say that in our county we had some years ago, when the State was assisting the county to build some roads, a number of pieces of state road built, and considering

the wear and tear that has been on them since that time, without any repairs, we think they were good roads; but having had no effect in all that time we think it would be a great pity for the state to let them go to destruction now. They need repairing now.

A Member: Mr. President that brings to mind this fact, that we have had a state road in my county for four years, and only two years ago and the last summer the supervisors had to go over the road and put on a fine coating of crushed stone to keep it in order. The matter of keeping up the public roads is a burden after they are built, and if this state board would take some action whereby the state looks after the maintenance of these roads besides the building it will be a good help.

The SECRETARY: I want to suggest that after a while we will have a Committee on Resolutions, and if any gentleman thinks of any legislation that he believes would be profitable and beneficial to agriculture, and will prepare the resolution and hand it to the Committee on Resolutions, and the Committee report favorably on it, they can go to the Legislative Committee of the State Grange as well as to the Committee on Agriculture of the House of Representatives and Senate. That will be a good way to get it started. I make this simply as a suggestion. The Legislative Committee of the State Grange is in session in this city now. If the resolution is presented to the committee the regular or appointed Committee on Resolutions of this Board and is adopted by the Board, and a copy sent to the Agricultural Committee of the House of Representatives and Senate, also to the State Grange, it certainly will stand a very good chance to get before the Legislature.

The CHAIRMAN: If you have any resolutions on legislation please hand them to the Legislative Committee as it will have a session at 4:30 this afternoon.

The Legislative Committee consists of H. G. McGowan, A. J. Kahler, Matthew Rodgers, S. S. Blyholder and E. B. Dorsett.

MR. HUTCHISON: I wish to state on the subject of calf meal that there are several brands on the market. We have the composition of three of them in our bulletin. You will find full directions how to feed on the package. It is a high concentrate. In preparing it for use mix it with a little milk to start with, and as you gradually get to feeding a little more mix it with water, and after a while you will get to feeding it without milk. You can scald it before you mix it. Scald in the morning that which you are going to feed in the evening. You can get full directions for feeding on each package. I have had experience in growing one calf with it. It is a feed that is very high in protein. This calf is growing very rapidly, it is not yet a yearling and is as large as any I have. I am not advertising this feed, I am just telling you one of the things that is on the market. There is no adulterant used in the making of this feed; it is pure.

A Member: We had a Jersey calf that we did not want to raise and we could not sell it to anybody, and we determined to feed it for the butcher without letting it suck the cow. By the use of the meal we sold it at four weeks old to the huckster for eight dollars.

▲ Member: I was struck with one thing in the statement of Mr. Hutchison, and that was this: The diverting of the funds on the building of boulevards in the boroughs and cities. I want to call attention to the fact that the same thing is working in our schools against the rural population. The schools of the towns are being built up and made first-class while the schools of the rural districts are neglected and robbed of the funds that should come to them but which are being used to support the schools of the boroughs and cities.

A Member: I want to add that there will come before the Legislature a bill called the School Code, one of which went through the Legislature two years ago, and very fortunately was set aside by Governor Stuart. This one goes considerably further in some respects than that one. It adds quite a number of things to the curriculum. I have been a school director off and on more or less for twenty years, and I feel thoroughly satisfied that should such a thing become a law the farmers of Pennsylvania will find themselves very much embarrassed. I find further and I think there are a great many other farmers in this state that will agree with me, that we have now longer school terms than the people in the country can comfortably take care of; and they easily agree with me now that we have as much curriculum as our children can handle, and that the only thing that we need now is better teachers if we can get them.

The CHAIRMAN: Any further remarks? If there is anything on that particular subject very urgent, put it in writing and present it to the Legislative Committee, because there are certain conditions in that that will come up in the regular work of that Committee.

If there are no other remarks on that subject, what action will you take on the Report of Brother Hutchison?

A Member: Mr. Chairman. I move that it be received and placed on file for publication with the proceedings of the Board.

The motion was agreed to.

The CHAIRMAN: The further order is New Business and Unfinished Business. We will take up the Unfinished Business first.

The SECRETARY: I know of none, Mr. Chairman.

MR. HERR: I would suggest that under the head of New Business we fix the time and place of our summer meeting. That is one item under the head of new business.

MR. HUTCHISON: I think the Committee on Credentials should report first, because each one of those gentlemen would be entitled to a vote. Could we not have a partial report of the Committee on Credentials.

MR. HERR: We are all members of the Board of Agriculture until the day fixed for the admission of new members and that will be tomorrow. Therefore, I guess my motion would be out of order.

The SECRETARY: I think we had better wait for the Report of the Committee on Credentials until tomorrow, when the new members can be received. The report could be received now so far as delegates are concerned, but not as to members of the Board.

Mr. HUTCHISON: Is that the decision of the Secretary or the law?

The SECRETARY: I do not know that the Secretary has the right to rule upon that question, but certainly the old members that are present, whose term expires with this year, have a right to act until their places have been filled by the incoming members. We are in session today, just as we were last year, and there can be no new organization or new work done that pertains particularly to the newly constituted Board until after the election tomorrow. That day is fixed by Act of Assembly.

The CHAIRMAN: The report of the Committee on Credentials being received does not necessarily seat the members until tomorrow at the proper time.

I think it is proper to have a Committee on Resolutions appointed at this time, will somebody make a motion to that effect.

A Member: Mr. Chairman, I move that five members of the Board be appointed as a Committee on Resolutions.

The motion was seconded, put and agreed to.

The CHAIR: As a Committee on Resolutions the Chair appoints Messrs. F. D. Kerrick, Bradford County; J. A. Herr, Clinton County; Sylvester Shaffer, Lawrence County; W. E. Perham, Wayne County, and M. P. Shoemaker, Westmoreland County.

MR. HUTCHISON: Mr. Chairman, I move that a Committee of three be appointed to wait upon the Governor.

The motion was seconded, put and agreed to.

The CHAIRMAN: The Chair appoints Messrs. Sylvester Shaffer, A. P. Young and J. H. Wilson as a Committee to wait upon the Governor and inform him that the Board is in session, and invite him to meet this convention.

The CHAIRMAN: Anything further under New Business, gentlemen?

MR. HUTCHISON: I would suggest that the Governor be waited upon as early as possible so that he may be able to arrange his matters to be with us this afternoon. If possible it would be excellent to wait upon the Governor this forenoon.

The SECRETARY: Permit me to say that possibly the members would be very glad to have the opportunity to go over to Johnston's Hall and look at the exhibits a little while before dinner. The Committee has gone to a good deal of expense in gathering and placing these exhibits, and we might take this opportunity of going over there and looking them over.

MR. CLARK: I just came from the building, and it is almost impossible to finish the arrangement of the exhibits with the crowd in the house.

MR. HUTCHISON: Why not ask Mr. Knuppenburg to report now?

The SECRETARY: He is not to be found.

The CHAIRMAN: We will now have the Report of the Committee on Credentials, if they are ready to report.

MATTHEW RODGERS (Chairman of the Committee on Credentials): Mr. Chairman, the Committee are only prepared to submit a partial report, as follows:

REPORT OF THE COMMITTEE ON CREDENTIALS

To the Officers and Members of the Pennsylvania State Board of Agriculture:

We, your committee, do find that the following named persons have been duly elected members of your organization from the counties herein set forth:

John P. Young, Franklin County.
 J. N. Glover, Union County.
 J. A. Herr, Clinton County.
 E. J. Durnall, Delaware County.
 D. S. Taylor, Washington County.
 G. F. Barnes, York County.
 Dr. W. Frank Beck, Blair County.
 W. H. Milliron, Butler County.
 J. Aldus Herr, Lancaster County.
 I. A. Eschbach, Northumberland County.
 W. C. Black, Mercer County.
 B. Frank Wambold, Bucks County.
 R. J. Weld, Warren County.
 Edward S. Keiper, Dauphin County.
 S. S. Blyholder, Armstrong County.
 J. H. Schultz, Montgomery County.
 John C. Weller, Somerset.

The credentials of C. H. Dewitt, of Tioga County, are held for further consideration.

The Lebanon County Agricultural and Horticultural Association have elected the following delegates to this meeting:

Clark G. Long, Jonestown, Pa.
 E. Shuey, Lickdale, Pa.
 J. H. Brubaker, Lebanon No. 10.
 Albert Barnhart, Annville.
 F. R. Fertig, Lebanon, Pa.
 E. S. Risser, Lawn, Pa.
 J. H. Bennetch, Newmanstown, No. 1.
 J. K. Dierwechter, Richland, Pa.
 L. E. Bucher, Myerstown, Pa.
 S. P. Heilman, M. D., Heilman Dale, Pa.

The Juniata County Agricultural Society have elected the following delegates to this meeting:

C. C. Mertz, Thompsontown, Pa.
 Stuart A. Robinson, Port Royal, Pa.
 James N. Groninger, Port Royal, Pa.

The Clarion County Fair Association has elected the following delegate to this meeting:

Peter Wingerd.

The Adams County Agricultural Association have elected the following delegate to this meeting:

W. W. Boyer.

MATTHEW RODGERS, Chairman.
PETER GEARHART, Secretary.
E. R. Warburton,
M. M. Naginey,
D. A. Knuppenburg.

The CHAIRMAN: What action will you take on the Report of the Committee on Credentials?

A Member: I would like to know whether the report of the Committee recommends that these gentlemen shall be enrolled as members of the Board at the proper hour tomorrow.

MR. HERR: I move that the delegates that were sent here be received as delegates and be allowed the privilege of the floor.

The motion was seconded, put and agreed to.

A Member: I would move that there be added to these members the Master of the Lackawanna County Grange, Mr. J. W. Ross.

The motion was seconded, put and agreed to.

The CHAIRMAN: What action will you take on the recommendation that the members be received?

A Member: I move that action on the members be deferred until tomorrow at the proper time.

A Member: What is the proper time tomorrow?

MR. HERR: Any time Wednesday. Wednesday is the day—any hour. I think their terms commence tomorrow, according to law.

The motion was seconded, put and agreed to, to postpone action on the election of members until tomorrow.

The CHAIRMAN: I think that the Chairman is ready to entertain a motion that visitors who are not regularly appointed by any society shall have the privilege of entering into the discussions. The Chair is ready to entertain a motion of that kind.

A Member: I move you that visitors be received and be given the privilege of the floor as others to take part in the discussion.

The motion was seconded, put and agreed to.

The SECRETARY: Mr. Chairman, I believe there are and will be a number of visitors here who will take part in the discussion and help our work along and I would be very glad if such visitors will send their names to the desk in order that they may be entered upon our minutes. The invitation now is extended to any organization of a fraternal character and these persons will have the privileges

of the floor. I would be very glad to know who accepts the invitation. So I will be very glad, Mr. Chairman, if they will just send their names to the Chair, or come up here and give their names to me.

◀A Member: The new members will have no say until tomorrow, until after their election?

MR. HUTCHISON: I move that these members be given the privilege of the floor in all deliberations except to vote.

The motion was seconded, put and agreed to.

The following visitors were then enrolled:

Ernest F. Pierce, York, Pa.
 E. C. Bowers, East Petersburg, Pa.
 J. S. Briggs, Norristown, Pa.
 M. E. Shay, Holmesburg, Pa.
 Harry Baker, Lake Carey, Pa.
 A. O. Finn, Clifford, Susquehanna County, Pa.
 Hon. H. R. Brunges, Tunkhannock, Pa.
 W. H. Bullock, Honesdale, Pa.
 John Henning, Mehoopany, Pa.
 W. J. Lewis, Pittston, Pa.
 H. W. Sweigert, Mifflin County.
 J. W. Yoder, Mifflin County.
 W. J. McFarland, Mifflin County.
 Charles McNeely, Juniata County.
 W. A. McMeen, Juniata County.
 Samuel Foust, Montgomery County.
 A. J. Hummer, Schuylkill County.
 Jerry Hoffner, Schuylkill County.
 John Shrop, Schuylkill County.
 J. W. Ross, Master of Lackawanna County Grange.
 J. D. Frederick.
 W. S. Ross.
 C. W. Shaw.
 A. B. Brodbeck.
 W. H. Patterson, Columbia County.
 H. M. Shaley, Union County.
 R. N. Atwater, Delaware County.
 Elmer E. Beck.
 E. D. Swartz, Schuylkill.
 James T. S. Way.
 Howard Kerrick, Bradford County.
 John T. Bashing, Adams County.
 George K. Hartman, Adams County.
 Ephraim Shelley, Adams County.
 M. M. Clark, Westmoreland County.
 Morris Swartwood.
 W. H. Stoud.
 John C. Miller, Union County.
 Alvin Dewitt, Adams County.
 C. G. Atwater, York County.
 J. Kerr Lott, Adams County.
 Francis J. McKanna, Westmoreland County.

MR. HUTCHISON: Mr. Chairman, I move that we now adjourn until 1:30 o'clock this afternoon.

The motion was agreed to.

Tuesday Afternoon, January 4, 1911, 1:30 P. M.

Vice President J. C. Weller in the Chair.

The **CHAIRMAN:** The meeting will come to order. We will now have the report of the Committee on Fruit and Fruit Culture, by D. A. Knuppenburg, Chairman, Lake Carey, Penna.

Mr. Knuppenburg then presented his report as follows:

REPORT OF THE COMMITTEE ON FRUIT AND FRUIT CULTURE

By D. A. KNUPPENBURG, *Chairman.*

The year that has so recently slipped out of the arena witnessed a decided march forward in many directions. Looking back over the record and weighing the importance of the different lines of progress, we naturally place at first, the phenomenal development in Agriculture. In the light of past events, I confidently believe that if the year 1911 sees advancement correspondingly as great as that of 1910 there will have been accomplished most marvelous results. In the march of progress those things that most closely concern the home, is the movement to make farm life more attractive and remunerative; the strong interest manifested in civic improvement and the increasing demand that the public schools shall furnish an all-around education that fits our children for active, honorable and self-reliant life. All these and many other forward movements are good, and should enlist the interest and support of every right minded person. The Department of Agriculture is to be congratulated on the changes that have been wrought along this line; but we are only standing on the threshold of what must be accomplished. This is not a result of second-hand information but a matter of absolute personal knowledge.

The people of the State of Pennsylvania have not fully realized the vastness and importance of the wonderful resources before them. Fruit growing *has* been profitable where near markets, but little has been done toward bringing the people to properly understand the great possibilities within their reach. However, we are prepared to report rapid progress. In proof of this, I wish to call attention to the display of fruits at Horticultural meetings, fairs, institutes, orchard meetings and Grange meetings, which speak in terms too plain to be misunderstood of the advancement of fruit growing in Pennsylvania. It has been fairly demonstrated that a great per cent. of our cheap lands are admirably adapted to the growing of fruits if intelligent and up-to-date methods are used. New acres have been uppermost in the minds of the husbandman. They as yet have scarcely begun to utilize them as they may and *will* in future

years. Fruit trees respond beyond the belief of the ordinary person even on what is called worn-out land. The roots penetrate deeper and feed on the fertility stored beyond the reach of the ordinary field crop. Fruit trees put on rapid growth if properly cultivated, fertilized and pruned, and the ever present insect pests held in check by use of improved spray methods, all of which must be followed up intelligently.

The State is doing a great work in bringing the people to understand and practice the new way of growing trees, gathering, packing and marketing fruit. In the model and supervision orchard work now carried on by the State through the Bureau of Zoology, the people are taught to select a proper site; next to prepare the soil for the planting; also how and where to buy stock, how to select varieties best adapted to each locality, how to plant, prune and fertilize; to know dangerous insect pests and how to suppress them. Among the most destructive of these are the San Jose scale, borers, codling moth, curculio, aphides, oyster shell scale, scurfy scale, Putnam scale and the caterpillars. Next comes the fungus diseases, blights, mildews, rusts and rots. Pennsylvania lost one million dollars in 1910 from the ravages of codling moth alone. We see apple, pear, peach, plum, cherry, blackberry, raspberry, gooseberry, strawberry and many other small fruits all in their natural state growing wild. What better proof can we look for as to the adaptability of Pennsylvania to fruit and fruit growing?

What would we think to see a lumbering railroad train with an ancient wood burning engine and a man between each car twisting away at a cast iron break wheel, trying to manage the railroad business of today? This would be just as much in keeping with the times as to see people trying to grow fruit under the system that prevailed fifty years ago. As our young men and women become educated, the farm home is left to the renter, and soon dissolution reigns. The work now in progress by the State of carrying practical information direct to the rural districts, is working out the problem to satisfaction. That is just what is happening on many farms in Pennsylvania.

The bounteous crops of fruit harvested where improved methods have been applied proves beyond a doubt that there still remains in Pennsylvania soil greater wealth than has ever yet been brought out. Thousands of people are encouraged and starting back to occupy the homes once left to the owls. Over 1100 orchards have been treated for insect pests with very marked results; seventy-five per cent. more fruit trees now growing in Pennsylvania than three years previous. Peach comes in profitable bearing the fourth year, apple four to eight years. Jonathan apple has given three bushels per tree the sixth year.

The fruit crop of Pennsylvania in 1910 was not large, and good prices prevailed; prices of apples last fall ranged from seventy-five cents to one dollar and a quarter per bushel. Peaches from sixty cents to one dollar and a half a basket. The kinds of apples most favored for planting are principally, Northern Spy, Baldwin, Rhode Island Greening, Stayman Winesap, Grimes' Golden, York Imperial, Winter Banana, Stark, Delicious and Jonathan. There is a growing demand for currants and gooseberries and a ready market for small fruits. The market calls for quality. The small things of earth confound the wise, and still there is room.

The CHAIRMAN: You have heard the report. What action will you take upon it?

MR. BLYHOLDER: I move that it be received and placed on file for publication with the proceedings of the Board.

The motion was agreed to.

The CHAIRMAN: The next on the program is the Report on Forests and Forestry, by Robert Conklin, Harrisburg, Penna.

The SECRETARY: Mr. Chairman, Mr. Conklin will not be able to be present at this afternoon's session, but he has sent as his substitute Mr. Robert E. Rupp, who belongs to his Department.

The CHAIRMAN: We will be pleased to hear from Mr. Rupp.

Mr. Rupp then presented the report as follows:

REPORT ON FORESTS AND FORESTRY

By ROBERT CONKLIN, *Harrisburg, Pa.*

It is the duty of a government to perpetuate itself, and in perpetuating itself there is a further duty to provide for the common welfare of its citizens. With these objects in view, it is wise for a state to see to it that every square foot of soil, the source of wealth, be made to produce its highest revenue. Whenever elements of production are allowed to be wasted, the whole moral fiber of those in connection with the waste is lowered and general dissatisfaction follows. The state in turn suffers from undesirable citizens, loss of industry, income, and at the same time outlay for remedial measures, and a host of economic conditions which can hardly be followed.

Pennsylvania stands high in the list of states, agriculturally, and we are all proud of her record, but as long as it remains true that at least 8,000,000 acres of productive soil are not paying interest on a low investment in them, to say nothing of taxes, and other millions of acres are not producing more than half of what they are capable, we can still bow our heads in shame and think on the matter seriously. When we grasp the enormity of this blot on our records we should be stirred to redoubled efforts to put Pennsylvania where she belongs—not high in the list, but the Keystone of the Arch.

The fact is sometimes overlooked that trees grow on soil and that a wood crop is just as truly a crop as a crop of wheat. It is this fact that I want to recall to your minds today. Trees will grow on soil which is too rocky or too poor to grow any agricultural crop, because only a very small percentage of their make-up is taken from the soil. But it is also true that some trees will grow much more rapidly on moderately good soil than they will on poor soil. They will grow on hillsides too steep to farm, where erosion is taking place or is hard to prevent, along streams, roads and in undesirable corners. They require practically no attention after planting and are all the time growing into value financially and otherwise.

Fifty years ago a farmer in Eastern Pennsylvania planted Norway spruce and European larch along his fence rows. Today the trees alone are worth almost as much as his farm, and yet they have taken nothing from his annual crops, but rather increased them by reducing evaporation over the fields. At least 4,000,000 acres of cleared farm land in Pennsylvania are fit only for growing trees. Why are they not being planted? Simply because the farmers do not know how, what or when to plant and the returns which may be had from planting. Education must be the keynote of our activity. The present schemes must be intensified, new schemes must be devised, and every means used which will bring economic farm education to every farmer and his family.

There must be more co-operation on the part of the Departments concerned—principally those of Education, Agriculture, and Forestry. School gardens, elementary agriculture, agricultural clubs, Arbor Day, and so on must be gotten into the schools. The school buildings should be the social centers of the communities, and if necessary, the Government must send out social settlement workers. Agriculture and forestry must no longer be left out of county and local teachers' institutes, nor should a consideration of the schools and forestry be left out of farmers' institutes. There are no forestry institutes, but lectures, bulletins, sample plantings and all manner of assistance must be provided for. It behooves every member of our Departments to make each appropriation reach as far as possible, but it is more important that results are obtained from what is done, and then the results themselves must and will speak for increased assistance from the Legislature.

During the past year the activities of the Department of Forestry advanced steadily both along established lines and along new lines. There have been added to the reserve area 17,000 acres, making the total area of reserves now owned by the State 933,582 acres. There are thirty-nine trained foresters and eighty-five rangers in charge of this large area, using every means available to develop it as rapidly as possible and to bring it up to the best economic production.

The importance of protection, especially from fires, is appreciated, but only a small part of a perfect system of protection could be carried out. The survey, opening and marking of boundaries has been continued. Over 1000 miles of roads or trails have been opened this year, making possible the better management of the reserves, and at the same time making them more accessible to the citizens of the State. Old material which would otherwise become fuel for fires or a hindrance to young growth has been gathered and sold at a profit. A number of fire observatory towers have been built and should now be connected with the foresters' headquarters by telephone. Improvement cuttings have been made and some old and decaying trees manufactured into lumber, the object in all cases being to make room for good, sound, young growth yielding a high rate of interest instead of that which is decreasing in value.

About 1½ millions of forest tree seedlings have been planted this year on the reserves and several hundred thousand more were raised in the nurseries and sold at cost to people of the State. In addition to this, the Department gave assistance to many individuals who wanted to make plantations by making planting plans for them and then superintending the planting itself. In the nurseries of the re-

serves there are over 5,000,000 seedlings, and the area and production of our nurseries are being increased as rapidly as possible. The Department aims at a planting record of 20,000,000 seedlings a year on State holdings alone, and that is none too few.

The reserves have been open to the public as recreation grounds and during the year 3,556 persons have obtained camping permits, these being required when it becomes necessary to build fires for cooking. The camps have been distributed in 22 different counties. There is absolutely no restriction in the matter of hunting and fishing on the Reserves, except what the game laws impose. The Department wants the people of the State to use the Reserves to their fullest extent, only asking that no needless damage be done to trees and birds, no game laws violated, and no fires built without permission. In addition to those obtaining permits, at least 10,000 persons have used the Reserves for hunting, fishing, or a day's outing not, however, including the thousands of people who frequently visit Mont Alto and Caledonia Parks on the South Mountain Reserve. We have no notion of the number of people who go upon the Reserves annually for berries nor of the value of the crop which they harvest.

The Forest Academy at Mont Alto graduated eight young men in August who are now in the State Forest Service. The work is being strengthened each year and the State can be proud of the young men who have been graduated from there and of the work they are doing on the State Reserves and in the localities where they have been stationed.

Assistance was given in the eastern part of the State toward studying and attacking the Chestnut Tree Blight, and in the western part of the State in an examination of the Ohio watershed with reference to forest conditions, erosion, storage of water, prevention of floods, etc.

We have also been able to give practical assistance to all who have applied with reference to the matter of handling their wooded areas. Our Forest Inspector goes over the ground in each case and formulates a plan suited to the conditions as nearly as can be determined in the time available. It is the aim of the Department to be of as great service to the people of the State as it is possible to be. Our offices are becoming a store-house of information on all lines concerning forests and forest trees, and that information is for the use of the public.

MR. RUPP: Mr. Chairman, I stand ready to answer any questions that the gentlemen here may ask regarding the forestry problems of the State at the present time.

A Member: Have you any forest reserves on the Allegheny River, in Warren county?

MR. RUPP: No, sir, we have none.

A Member: You have none on the Allegheny watershed?

MR. RUPP: Yes, sir, we have in Westmoreland county, but it is only a small portion; it is very light.

A Member: In the southern part?

MR. RUPP: Yes, sir; none near the head water. We have some in Cameron county.

A Member: What do you sell these little pine trees for planting at?

MR. RUPP: The intention is to sell them at cost and that may vary. We have three nurseries, and one nursery may produce them cheaper than the other, and considering the transportation, you could not have a definite cost, but the intention is to furnish them at cost.

A Member: Have you sold any yet?

MR. RUPP: Yes, sir, we sold a few, but at the present time we are able to plant on State land more than we can raise. I am willing to go on record as saying, with the fullest credit to the nurseries in the business, that the State will be able to furnish its citizens with seedlings at one half what would be paid at the nursery.

A Member: Do you believe there is any profit made in planting locust trees?

MR. RUPP: There is. It depends, of course, on the section of the State. The great enemy of the locust is the locust borer. Take Westmoreland county and the western part of the State, we do not have much evidence of the borer, and in this section it is profitable to plant, and where you want timber to last a long while there is nothing more durable than locust.

MR. HUTCHISON: How long will it take a locust tree to grow ten inches in diameter on fair soil?

MR. RUPP: About thirty years on the average soil.

The SECRETARY: How large do you want it to grow?

MR. HUTCHISON: I only want to know the length of time it takes to produce locust. The railroad company is planting large numbers of them, and I was sort of anxious to know how long it would take to grow them ready for use.

The SECRETARY: In the thirty years, what is the growth?

MR. RUPP: I was taking the average soil. You can produce it in a shorter time on good loam soil, but that soil you would not care to devote to growing of trees when you can farm it.

MR. HUTCHISON: Would you recommend the farmer to plant on his soil locust, or black oak, or red oak, pin oak or what?

MR. RUPP: For posts?

MR. HUTCHISON: Growing for general profit.

MR. RUPP: If the farmer took the quick growing species, the locust would be one of them, North Carolina poplar another, and the maples are another, and the red oak is a very good one. That is being grown by the Pennsylvania Railroad Company at the present time to take the place of their locust which they had originally started out to plant.

MR. HUTCHISON: What about the white pine? Does it not grow fast?

MR. RUPP: The white pine is all right, but that is for home consumption. It would not pay the farmer to plant the white pine for farm purposes.

MR. HUTCHISON: How would yellow poplar do?

MR. RUPP: That is a good tree and quick grower. The planting of trees must be determined on the ground. One man might tell your neighbor to plant locust or poplar, and the man on the other side to plant something else. The conditions might differ, and it would not be advisable to recommend anything until you were on the ground and able to see the conditions.

MR. HUTCHISON: Would you recommend catalpa?

MR. RUPP: Not in this State on account of the frost. It has been tried at Mont Alto. As long as you keep the terminal buds protected it does well, but it does not seem to be the right locality.

A Member: How about North Carolina poplar?

MR. RUPP: It is all right. It is a little bit softer, but in durability it is as good, although not very durable for posts.

A Member: What success have you had in controlling the Chestnut Blight?

MR. RUPP: They have started out on that and as far as they have gone the only remedy at hand at present is to attack the tree itself and burn the bark, and in that way destroy the spores, so it cannot propagate any more. There is nothing to prevent it from spreading as long as spores are available, and the only thing to do, we have to make a wholesale cutting, and attack and destroy the bark or the tree if necessary, so that you destroy the life of the germ.

MR. HUTCHISON: Would it pay to raise black walnut?

MR. RUPP: Yes, sir, it would.

MR. HUTCHISON: How long would it take to grow a tree of black walnut ten or twelve inches in diameter?

MR. RUPP: To grow the black walnut with any success you have to consider the conditions. You have to put it on good agricultural soil where you get deep loam and then black walnut will grow favorably with the white pine, and in fifty years you will have a good big tree of black walnut on good soil.

MR. HUTCHISON: We can grow them a foot thick in twenty years.

MR. RUPP: You have a good loam soil then.

MR. HUTCHISON: Yes, that is a fact.

MR. RUPP: I don't believe it would be a financial proposition to plant black walnut because that soil you want for farming.

A Member: Isn't a fact that locust will do much better in some localities than another?

MR. RUPP: Oh, yes, indeed. As I said before there are some localities not affected with the borer, Westmoreland county, and take along certain ridges there they are not affected with the borer yet. On the other side of the ridge they are.

A Member: Are there not some varieties of locust much more affected than others.

MR. RUPP: I do not know.

A Member: I think I saw that difference on my own farm.

MR. RUPP: There may be different varieties of locust, but the locust we speak of commercially is black locust. On the State reserves we are doing a little planting of the honey locust. I planted a plantation this spring of four thousand honey locust and they are doing well, and I think it is a good move, and if I were to plant I think I would plant the honey locust in preference to the black locust when on fair soil.

A Member: How does the lasting quality of it compare with black locust?

MR. RUPP: Not as well as black locust.

A Member: What would be the general reasons for planting the honey locust in preference to the yellow?

MR. RUPP: The honey locust is a yellow locust. You mean in preference to the black locust, that is planting of honey locust in preference to black locust?

A Member: I understand honey locust in our county is different. We call it yellow locust the good substantially, durable locust. And there is the white locust.

MR. RUPP: The white or yellow we don't make any distinction. We call it the yellow or honey locust, and the other the black locust. There is no difference between the two former. I think from personal observation that the honey locust will really grow as rapidly as the black locust and it is less susceptible to the attack of the borer. Using the locust for making pins and one thing and another like that, the honey locust would be just as good as the black locust, but if for railroad ties or posts, why I think that the preference must be given to the black locust. I am speaking from a commercial standpoint.

A Member: There are three, the honey, the yellow and the black.

MR. RUPP: Honey and yellow are one.

A Member: They have some ornamental ones they call honey.

MR. RUPP: Oh, yes, we have dozens of varieties when you go into the horticultural species.

The SECRETARY: What you are calling the honey locust is the locust with smooth bark and long trunk?

MR. RUPP: Yes, sir.

The SECRETARY: Are there two distinct species besides that, a white and black?

MR. RUPP: There is not to my knowledge; if so it is a horticultural variety.

The SECRETARY: My own thought is that the white locust gets its peculiar color from growing out on cleared land. I may not be right on that. I want information.

MR. RUPP: I could not tell you whether that is so or not. I would like to ask Mr. Rodgers if he knows anything about that; is the white and black locust the same?

MR. RODGERS: I don't think they are. Their lasting qualities as far as my experience goes, are entirely different. The white locust will not last as well and my impression is that is so because it grows on the cleared land.

The SECRETARY: I certainly think that grown on the same land it should last as well. I am glad to be informed in regards to that. We have the black locust but none of what is called the white.

MR. RUPP: He spoke of the white locust. I think he referred to the yellow and honey locust.

The CHAIRMAN: Wouldn't it be profitable to plant spruce?

MR. RUPP: Spruce for what purpose? The spruce is all right. We are planting spruce for ornamental purposes. The Norway spruce, which is a large tree, and the Department has been considering whether they would plant more Norway spruce and less white pine. But we will have to take the section of the country into consideration if we wish to make the change. We know that the pine will grow in a soil that will hardly produce any other tree. If we switch to the Norway spruce we are apt to have a little better soil.

The CHAIRMAN: We have some out our way twenty-five years old, and they are sixteen to twenty inches now, and they grow fast.

MR. RUPP: The only trees I know of are those that are planted ornamental.

The CHAIRMAN: It is the Norway spruce that I have reference to.

MR. RUPP: Yes, sir.

The CHAIRMAN: You have heard the report. What action will you take upon it?

MR. HUTCHISON: I move that it be received and placed on file for publication with the proceedings of the Board.

The motion was agreed to.

The CHAIRMAN: The next topic is the report of the Economic Geologist, Dr. Isaac A. Harvey of Lock Haven, Pa.

The SECRETARY: Mr. Chairman, I have not seen Dr. Harvey. I suppose he is not here. I had a letter from him this morning saying he would try to be here if possible, but if not here his report will be here by tomorrow.

The CHAIRMAN: The next on the program is the report of the Agricultural Geologist, W. H. Stout, Pinegrove, Penna.

MR. STOUT: Mr. Chairman, Mr. Martin, gentlemen of the Board and Citizens: In listening to this talk on forestry, it brings up some reflections that come to me from my travels over the State, realizing the fact that the soils have a great deal to do with the growing of all crops, and the forest growth is always the largest on the richest soil. When we travel over the agricultural sections of Eastern Pennsylvania, and go into the limestone country and little valleys you will find the great oak and hickory tree and hard wood, and when you go up in the hills and get on the ridges it is changed to pine and hemlock; and then too I have observed also that in the valley, not only the forest trees grow larger, but the barns and the houses and the people grow fatter and a little more indolent than they do in the agricultural soils.

MR. HUTCHISON: You saw how they were up our way last week.

MR. STOUT: They are all fat up there. I had hoped that Mr. Harvey would be here, and that I might gather some information from his discussion on this subject, but in his absence I have to depend upon myself.

Mr. Stout then read his papers as follows:

REPORT OF AGRICULTURAL GEOLOGIST

By W. H. STOUT, *Pinegrove, Pa.*

As distinguished between Economic and Agricultural Geology, the former relates to minerals and metals with other useful substances in civilized countries. Agricultural Geology relates to that more important division relating to soils, the producing elements of energy, of muscle, flesh, bone and brain and life itself. The herbs of the soil provide the essential elements to support all animal creation upon the earth, all of which derives nourishment from Mother Earth. Although there exists a liberal library upon Agricultural Geology, it is comparatively small compared with Economic Geology, evidently because in this country, its importance was not realized earlier as long as unlimited resources of fertile fields could be obtained for the asking and Uncle Sam was rich enough to give us each a farm.

It seems only recently that the fact has dawned upon this nation that agriculture has not kept pace with the natural increase of population and the great influx of immigrants, that an alarm was created by high prices and in some lines a shortage of food products. Occasionally, bulletins are published by the Experiment Stations, but are not extensively read or heeded, and lately the United States Department of Agriculture has entered the field under the title of Soil Survey, in which is engaged a large force of very talented scientists as also some that are not overly qualified.

The voluminous nature of the Soil Survey publications militate against popular interest and the introduction of a new nomenclature, introducing new names for many formations about which there already exists confusion between National and State designation, renders them even less popular. What was known formerly as limestone soil of the great valley south of the Blue Mountain is termed Hagerstown loam, alongside of the Utica and Hudson River shales and slates termed Hagerstown shale loam, Hagerstown stony loam, Hagerstown sandy loam, Porter's black loam, Porter's clay, Porter's sand, Cecil clay, Cecil loam, Sandy loam, Penn clay, Penn loam, Penn sandy loam; then we have Waverly, Marion, Miami, Hanover, Mackinaw and a great variety of local names that apply to practically the same soil characteristics in various and distinct localities. The glacial deposits of the northern section also receive many new names, according to the locality where examined, although the clay, sands, gravel and boulders are practically similar.

Whatever the sources of a soil may be, a proper proportion of sand and clay are the requisites for a good, friable, retentive, easily worked soil. If lacking lime or other substances, these can be supplied and the soil made fertile; now found necessary on many fields that were once productive but depleted by cropping. This State and the country contains a great variety of soils, taking the entire area under cultivation and it is evidently unfair to make this a standard for comparison in crop production with other countries.

England is an illustration. An island of small dimension with a humid, cool climate, tempered by the Gulf stream and a soil largely composed of chalk and lime or volcanic and glacial deposits, with an average yearly rainfall and no such protracted periods of drought to which much of this country is subject, the conditions are quite different. In some parts of Pennsylvania like the counties of Bucks, Berks, in part, Lebanon and Lancaster, the average yield would compare favorably if not fully, with that of any country, while the Mississippi Valley or the states on the Pacific Coast would afford a fairer comparison.

Maine produces more bushels of corn to the acre than any other state, because there are only a few acres, seventeen thousand, in corn; New Hampshire, Vermont, Rhode Island, Massachusetts and Connecticut exceed Iowa by ten bushels an acre, but the Eastern States cultivate only two hundred and thirty-nine thousand acres, while Iowa cultivates nine and a half million acres, or practically four times as much as all the New England states. So, with potatoes; Maine produces two hundred and twenty bushels average to the acre, while Pennsylvania reports eighty-eight. There are good reasons for the difference, in climatic and soil conditions, with the small area devoted to these crops.

The question suggests itself: If the average for the entire country were up to the highest standard, with thirty bushels of wheat, fifty bushels of corn and two hundred bushels of potatoes, what would the producers receive under such conditions?

In the less productive soils and sections, the Upper Silurian, Devonian, Carboniferous and other systems, where the cultivated ground consists of shale, stones, all clay or sand resting on the upturned edges of the bed rock, at uneven depths below the scanty soil, the

yield is reduced at a low average. It makes a material difference whether a soil is a hundred feet in depth or whether one or two feet.

A first class soil, if run over a screen of a fourth inch mesh, would practically all pass through, while that from shale and sand stone consists of material too coarse for plants to obtain the elements of plant food contained, affording a much smaller surface to the feeding of roots, besides the moisture holding power of the finer soil.

Loam, a term frequently used to denote a good soil, chiefly composed of silicious sand, clay and carbonate of lime, with more or less of oxide of iron, magnesia, various salts and decayed vegetable and animal matter. Sand and clay are principal elements forming soil that is friable, easy to work, retentive of moisture and fertility.

Sandstone forms a sand soil; the various shales form clay of various colors; red, yellow, black and intermediate colors; often a very fine clay, hard to work, and frequently if not generally improved by drainage.

There are thousands of acres of such land in this and other Atlantic Coast states, that might be redeemed and made fertile, if the same government aid was afforded agriculture, that is given to irrigation and draining swamp lands in the Southern and Western States. While in the Eastern states, agriculture is taxed and tarified to supply funds to redeem a great area of unproductive land and bring it under cultivation, they are asked to create competition with themselves and supply the money to do it. A little digression from the strict adherence to the text may be permissible, because all that is mentioned bears upon the subject under consideration.

There is much concern about the future in agriculture in this country and the abandoned farms in many sections, yet the industry seems prosperous in production and no abandoned farms found in sections where the soil is naturally fertile. The rocky cliffs, beechy shale hills and tenacious clays cannot be made to maintain a successful agriculture, except at a cost far above the value of ordinary crops and the owners of such lands are not financially able to specialize. After eking out a precarious existence under adverse conditions, without capital to change to poultry, fruit, dairying, fish, frog or skunk farming, the land must simply be abandoned to avoid distress or starvation in many instances. The encouragement for farmers to produce larger crops does not appear very flattering, when the results are analyzed, when large crops such as were produced last year are worth less than the medium crops of other years.

Having no control over the prices at which general farm crops must be sold in competition with all the world, and the different sections of this country, there is little or no profit except perhaps, in sections where the soil is fertile and not depleted of fertility by constant and long cropping. The crops produced last year in this country amount to the vast sum of nine billion dollars in value, yet dividing it among the six million farms in the country the average share of each is fifteen hundred dollars. In this State the farmers spend about eight million dollars a year for commercial fertilizer, how much more for lime and manure, there are no records, but the money spent for these articles is a large aggregate.

Things that farmers must purchase, taxes, labor, fertilizers, railroad fares, freight and express rates are not reduced, while farm crops are worth eight and one-half per cent. less than one year since; the

decline amounting to two hundred and thirty-six million dollars. There is nothing to encourage agriculture, except the plaudits of transportation lines and consumers; these spur the farmer on to renewed and more strenuous efforts, for the coming year. The report was current recently that the German Government proposed to levy an almost prohibitive export duty on potash, so much needed in our agriculture, that it seemed advisable to annex that country to this, to secure cheap fertilizer. Since the reports were first circulated, the German *Kali* importers explain the situation in recent "ads" in agricultural publications, indicating that the tax will be from fifteen to sixty-five cents per ton.

Farm practices in the treatment of the sands and clays are not always scientific, and farmers are severely criticised, especially by some people who do their farming in cozy offices on rosewood and mahogany desks, from the theories advanced by impractical students, with limited environments and close at hand observations, and from these formulate a theory, that does not meet general conditions. Farmers are also criticised for soil exhaustion and small crop yields, while the fact is that few farmers wilfully deplete soils, except as the products are needed to meet necessary expenses and to support themselves. Undoubtedly, many farms are producing less than fifty years ago, because, grain, hay and livestock were sold for needed funds. Throughout Eastern Pennsylvania, there was scarcely a stream available in farming communities, that was not employed in grinding grain for export and city uses as breadstuffs, besides numerous distilleries turning corn and rye into an abomination before the Lord, in the form of whiskey, thus destroying one of the most important National resources to provide food and drink for the hungry and thirsty, at home and foreign countries.

After all the years of tillage, the sands and much of the clay remain, although somewhat diminished. Transported soils by water or through glacial agencies contain a variety of sand and clay mingled together from various formations, while soils derived from the underlying formations are the same as the rock from which derived and, in many places where the stratification is vertical or steep dip, there is little uniformity, but a considerable difference in short distances. Our honored Executive, Governor Stuart, in his late message to the Legislature, writes thus: "The farms must be saved from exhaustion of the soil." Possibly, the Legislature in its wisdom may devise a method to accomplish the object and solve a problem that has concerned many generations and many nations, without a successful solution until now.

The subject of soil preservation is simply a question of economics, while the principles enunciated by eminent scientists are recognized as established facts; to carry them out, however, under prevailing conditions, is another problem. When the average farm products realize the producer thirty-five cents on the dollar, it becomes a question of dollars and cents. While it is true that the application of potash, phosphorus, nitrogen, lime, manure, turning down green crops and intense cultivation does maintain fertility, the question of cost and the capital necessary to conduct operations and await results enter into the problem which the average farmer does not possess.

The problem of soil preservation is one that has concerned nations for ages and is therefore not new. All nations in history had the same experience; their rise and fall, a prosperous and declining agriculture, extravagance and corruption in government, waging wars of conquest with vast armies that wasted all the wealth that agriculture could produce, are now in a condition of ignorance and bigotry. Some of the most renowned, once famous, prosperous and wealthy sections are today the homes of poverty and distress, remembered only in history, poetry and tradition.

The CHAIRMAN: You have heard the report of the Agricultural Geologist. What action do you desire to take upon it?

MR. HUTCHISON: Mr. Chairman, I move that the report be received and filed and printed in the journal of our proceedings.

The motion was agreed to.

The CHAIRMAN: The reports are now open for discussion.

A Member: Would it not be in order to receive the report of the committee to wait upon the Governor and secure his presence here?

The CHAIRMAN: If that committee is ready to make a report we will hear from them now.

MR. SHAFFER: Your committee beg to report that they have conferred with the Governor, after some difficulty in finding him, and he has advised us that he will be here at three o'clock this afternoon.

The CHAIRMAN: That will be thirty-five minutes yet so we will take up the discussion of the reports presented. We have had the reports of the Committees on Fruit and Fruit Culture, Forests and Forestry and the Agricultural Geologist, and any of these reports can now be discussed, and we can then go on with the next topic on the program.

MR. HUTCHISON: Mr. Chairman, it is important that we have some reports coming in when the Governor will be present. If I understand it rightly, you only have one more topic on the program for this afternoon and would it not be proper to take up this time that we have until his appearance with discussion on some of the subjects brought before the Board by the numerous reports. There are quite a number of men here who are good speakers, with different views. Let us now put in this half hour discussing some of these able papers, such as this valuable paper of Mr. Stout's that has brought out some wholesome truths about the soil; so that we could have a good paper or lecture when the Governor is here.

The CHAIRMAN: Any other one wish to make any remarks on the reports. If not, I will include the report of the Committee on Roads and Road Laws. We will always get a discussion on the road question.

The SECRETARY: Don't you think we better postpone any discussion on that subject until the Governor is in so that he can hear what the farmers are thinking about it?

A Member? Mr. Chairman, I would like to ask the representative of the Forestry Department to give us the life history of the locust borer.

MR. RUPP: Mr. Chairman, I am afraid I am not able to do that off-hand. I could not do it, not to give it in the way that I would care to give it to you; but I will work up the life history for you and send it to you if you will let me have your address.

The Member: Later on.

The SECRETARY: I would suggest that at some of our sessions we will have with us some of our entomologists that are associated with the Bureau of Economic Zoology who will answer that question and we will let that go over for the present and get the answer for the benefit of everybody. If you have it written to you, what is the other fellow going to do?

MR. WELD: Mr. Chairman, as Chairman of the Committee on Memorials, I wish to ask if there are any members deceased or ex-members deceased except Mr. Jason Sexton in the past twelve months.

MR. GLOVER: Mr. Charles Miller, who conducted institutes in Snyder County, passed away in December.

The SECRETARY: Is he an ex-member of the Board?

MR. GLOVER: No, sir.

A Member: There is a matter which interests me and also the people in our section of the State, brought out in the report of Mr. Knuppenburg on spraying for San José scale. It is a question of forestry in our county, preserving our trees, and I would like at this time a little discussion in regard to the question as to the merits of the different kind of sprayers for spraying. We have a number on the market and I would like to have a discussion on that just now, a little information from anyone.

The CHAIRMAN: Has anyone anything to suggest along that line?

The SECRETARY: Mr. Chairman, I have only the same suggestion that I made a moment ago, that that matter can be taken up when we have someone in here from the Bureau of Economic Zoology who will be able to give us the right information and we can get it first hand.

MR. HUTCHISON: Mr. Chairman, I would like to ask a question on poultry: What is a good average produced at this time of year from a pen of 160 hens? The majority of them were pullets. What would you consider a good average egg production, Mr. Wittman?

MR. WITTMAN: If they were my hens I would want at least 100 eggs a day, and if I got less than that I would not be satisfied. On the other hand, lots of people are not getting any at all with that number of fowls.

MR. HUTCHISON: What would you feed them to produce that number of eggs?

The SECRETARY: Weed seeds?

MR. WITTMAN: On a system of high feeding. That is the matter I brought out this morning, that we can feed husks and hulls but get no results. Give me the good red wheat and some corn and perhaps some buckwheat, some oats, barley and Kaffir corn, and some weed seeds to vary the ration. We people, if we had to make our ration on bread without butter or salt, would get hungry and if we want to force feed the hen we have to feed succulents or something to tickle and keep up the appetite, on the principle that when that is done they will eat more of other things. I can count my eggs from the feed that is given the hens.

MR. HUTCHISON: How often would you feed these chickens in a day?

MR. WITTMAN: The succulents I would bring down about the middle of the day when there is no danger of their being frozen. The others I would feed once a day, put the feed in the scratch litter, about the middle of the afternoon, three or four o'clock fill up all the cracks with a good rich mash, put in good rich food, muscle builders.

MR. HUTCHISON: Wet mash?

MR. WITTMAN: Yes, sir. I am very glad to see New York has just published a bulletin condemning the principle of feeding dry mash. The people who are feeding dry mash are losing money. It is not an economic way to feed and get good results.

MR. HUTCHISON: Brother Cornman, what is your experience feeding wet mash?

MR. CORNMAN: Brother Wittman and I would not agree upon that. My experience is that dry mash is a more economical feed than wet mash and fed more successfully.

MR. STOUT: Mr. Chairman, it seems to me that these poultry experts must have a bonanza when it comes to eggs that sell at forty-five cents a dozen; when they get a dozen while we are getting five or six it strikes me that they must have a cinch.

MR. WITTMAN: This is my objection to dry mash: I cannot get my hens to eat enough to lay me 100 eggs a day. On my travels this winter I met a man who complained about his chickens and when I went and look at them I found he was feeding dry mash in a box with a slip on the top of the box and that man was feeding a pollution of hen manure, and that is likely to add intestinal troubles and get their bowels out of order and if they would have intestinal worms it might affect the whole flock. In feeding wet mash or dry mash people must use common sense.

MR. CORNMAN: I want to say the man who feeds dry mash exclusively will make a failure. I only advocate the feeding of dry mash once a day. I want to give in the morning the small grain in the litter and make them work, work for every grain of that they get, and during that period the hoppers are closed. At noontime I want to open the hoppers and let them have access until roosting

time. I want the birds to work in the morning. A working hen is a paying hen and you want her to work in the morning if you want to get eggs.

MR. HUTCHISON: Will they eat as much dry mash as wet mash?

MR. CORNMAN: Yes, sir. As much dry mash as wet mash and eat it in a much more sanitary condition. I can keep the sanitary dry mash in the hoppers and you cannot keep wet mash in a sanitary condition; unless you scald your vessels every day you are bound to get sour feed in there and it is almost impossible to feed wet mash in a sanitary condition.

MR. WITTMAN: If any one in the room will try to eat a mouthful of that dry mash and remember the hens have no spittle or teeth they will not wonder that the hens have to screw it down and go through all sorts of contortions. I want my hens to eat comfortably and be happy. I know that chicken men are divided in their ideas about the possibilities of dry and wet mash. On the other hand, the wet mash fellows can show the advantages to the dry mash fellows in raising chickens or producing eggs. I can keep my wet mash sanitary by giving only what they will eat up quickly. It must be good and liked by them, and enough to fill up the cracks and let them be happy and enjoy themselves.

MR. CORNMAN: I want to say that they eat the wet mash entirely too fast. We had a discussion this morning with reference to weed seeds in chick food. I would have liked to have taken up the matter because I think Mr. Hutchison got the two confused. He spoke about scratch feed and then almost in the same breath spoke about chick feed. They are entirely separate and distinct. Now, in speaking of weed seeds in chick feed, it recalls to my mind an incident that was told me personally by a German in St. Louis. I was over at Chicago judging there. In conversation he said that he was interested in poultry and that he had started to raise chickens out from St. Louis and he said: "I sure did have troubles of my own. I goes to St. Louis and I buys a lot of that prepared chick food and I have chickens all over the farm and I feed them all over the farm; and there was a little bit of seed they would not eat. I do not know what it is but the next spring the whole d—m farm was full of weeds." There are a lot of weed seeds in that chick feed that the chicks will not eat.

MR. HUTCHISON: I admit I had not read over that last part that should have made a clear distinction between chick feed and scratch feed. What I mean by chick food is particles of grain crushed. I did not mean to allude to the feed for little chicks at all.

MR. CORNMAN: Another thing that I have noticed is that a great deal of that chick feed has adulterants in it in the shape of grit and shell.

MR. HUTCHISON: Our law covers that and we prosecuted a number of companies that were placing grit and shell in their chick and scratch feeds.

MR. CORNMAN: You have it in the chicken feed largely used

MR. HUTCHISON: You can buy that shell and grit for a small sum. The Secretary rules that they should not be in there under our law. I would like to ask a question. I was at the farmers' institute the last four or five days and there was a question came up in our institute about raising turkeys. In Shoemakers Valley they raise thousands of them and ship them to Pittsburg by carloads. In our valley it is almost impossible to raise turkeys. They all die when little or when they get to a little age. We don't know what is the trouble. We don't get such good fellows as Brother Wittman and Brother Cornman at our institutes at one time; but now we have them together I want to thrash this out. On this question if we had Brother Jackson, of State College, we would have another side. I will start with Mr. Wittman here. What is the cause for the loss of these turkeys when six weeks old?

MR. WITTMAN: Wittman is an old chicken doctor but he don't know much about turkey diseases. I think a great deal of the trouble is caused by lack of vigor. Where there is trouble I think the ground should be renovated and the young turks when they show the red should be turned loose and let look after themselves a little.

MR. CORNMAN: I think a great deal of the trouble is that the turkeys are too closely related. Where they are raising turkeys in a neighborhood they often select of their own young toms and breed in and in and you must have some other good blood to give vigor.

In reference to black head, I think the main trouble is disordered liver. If people who are trying to raise turkeys will go after the liver of the young turkeys as vigorously as they do themselves when they have a bilious attack they will have fewer diseases. As for the lice, they reduce the vitality of the turkey and thus render them more susceptible to disease but are not the cause of it.

MR. HUTCHISON: How would you prevent black head?

MR. CORNMAN: I don't know unless you would begin with the young turkey and at regular intervals give something for its liver?

MR. HUTCHISON: What would that something be?

MR. CORNMAN: Same as you would take, a liver pill, calomel liver pill same as you would take for yourself. Chase their liver and chase it vigorously.

A Member: I think Mr. Cornman and Mr. Wittman are both a little wrong in regard to the turkey question. You must all remember that the turkey is a wild bird and in its wild state is a healthy bird. It don't know anything at all about black head where it approaches the wild state and is then in fact a very healthy bird. I have on several occasions brought these wild birds up to my farm and kept them in captivity and have thus brought in new blood and the result was that my birds were very healthy. I have gone out of the turkey business but I have gained some experience and that is if we can introduce wild blood and get turkeys back near to nature we will lose lots of our troubles with lice and black heads. The active wild turkey will not be covered with lice, just the same as the active chicken, because it is active enough to play in the dirt and get rid

of the lice by their own natural means. If you go to doctoring a turkey—and I have had an experience of twenty years—you will find that you will kill the turkey. If you put grease on its head or the manufactured lice powder you will find the skin of the turkey is too tender to stand it. My experience would be to try to get a wild variety of turkeys to introduce into our flocks and we will finally bring back the turkey raising in this district.

MR. WITTMAN: I agree with the gentleman. Mr. Cornman said the trouble is with the liver. Of course it is. What do we farmers do? That turkey all winter through is fed on corn and the liver will not act. If you will give the turkey a natural run and a variety and plenty of food that mother turkey will lay eggs that you cannot kill the little turkeys. The eggs will hatch strong little turkeys. The black head is a disease the spores or germs or bacteris of which exist in the ground. Change the soil, renovate it. We can bring perfect health. Let the turkeys on the ground; we will run the chance of getting the black head. You cannot doctor the turkey; we should not doctor the chicken. Keep out the corn that spoils the liver and egg of the parent turkey and then we will have vigorous turkeys. In fact, we as Pennsylvanians ought to be ashamed when we say that we cannot raise turkeys when they raise themselves. We say that they are native here and our soil and climate is adapted to the turkey and we can raise them if we use common sense.

MR. HUTCHISON: In other words, have the turkeys out doors and not put in coops at all?

MR. WITTMAN: Yes; have the parent turkey out of doors all winter.

A Member: At what age would you let them out all winter?

MR. WITTMAN: I am talking about the parent stock. On the other hand, there is nobody ever kept the little baby turkey that grew in the hills in a coop.

A Member: At no time would you keep the old ones in?

MR. WITTMAN: No, never in a coop. Lots of people are afraid the little turkeys are going to get wet. I am sure the Spring rains are come to make them grow. Some people would have the young turkey sport a pair of boots and umbrella. Let us have strong, vigorous turkeys and then we can raise them.

A Member: Referring to the young stock, at what age did you say you would turn them loose?

MR. WITTMAN: Just as soon as they showed the red. Then it is perfectly safe. I do not mean when the heavy rain comes that we are not to get the turkeys under cover and let the mother hen roam over a three acre lot. I mean a little wholesome neglect and in a couple of generations we will have a strong sturdy race of turkeys, and put some of the original wild blood in them.

A Member: Isn't it a fact that turkeys are often hatched too early; that turkeys hatched from May to June always get along?

MR. WITTMAN: Yes, that may be true because of our way of stimulating by feeding all winter. If the turkeys are left go till later in the Spring their eggs are apt to be better and their hatches will likely be stronger.

Agriculture in Public Schools.

MR. BLYHOLDER: Too much turkey at one meal won't do, so I want to inject another subject that is not on the program. We have discussed for many years the subject of introducing agriculture in our public schools. It is a live question and the great trouble has always been that it has been said that we do not have books suitable to introduce in our public schools.

Now, the reason that I raise this point is that I want to call your attention to the book that I believe is the very thing to supply that want. We have all been handling it for a number of years and never thought of putting in the public schools, and that book is to take the place of the advanced readers in our public schools, and very naturally it does not only teach agriculture but it will teach the children business along with agriculture and I believe if we were to introduce in our public schools the proceedings of this body we would have a reader in that school that could not be equalled by anything. (Applause) Now, I refer you particularly to the proceedings of the Spring meeting. I do not know but what the Winter meeting's proceedings would do as well; but I think the Winter meeting has more business in it and is more of a business session than the Spring session. Take the proceedings of the meeting last May at Butler. I want you to examine that because I want to call the attention of the Legislative Committee to that fact, and I want you to examine that and then be ready to say to us whether you think this committee ought to put this proposition in proper shape and form to be put in your public schools as a reader.

The first thing the teacher would do would be to explain that this book is the proceedings of the State Board of Agriculture. The boy would say, what is this State Board of Agriculture. Well now, there is an opening for the lesson, for the teacher to explain that. Then we open up the books and we see how the Board conducts its business and the matters that are brought before it and discussed and it teaches the boy and girl to do business and how to conduct public meetings and it teaches the scientific truths of agriculture up to the very last day, because we have in our meetings those who are able to furnish us right up to the very latest, the scientific truths. Now I want to put this question before this body to think of, whether we have not got the very book we have been asking and looking for this long time. I believe with the research that I have made and the study I have made that this is the very book that ought to be put in the public schools. I think it would supply the want in teaching business, the conduct of public meetings and teaching agriculture in a way that we cannot get it in any other way. I raise this question because we have been discussing the subject up to this time and I would like to hear from some other persons because I think it is time we ought to act in this matter and because we appreciate that boys and girls are worth more than all the products and all the crops

we can raise and we ought to raise them and prepare them to take our places and be more successful in retaining the productiveness of the soil and raising products than we are because of the knowledge they would get and the facts being taught in this way would instill a taste and inclination to stay on the farm instead of leaving it. I say we would teach all that as we go along in the work. I would like to hear from somebody else.

A Member: I would like to ask if the gentleman who has just spoken ever taught public school?

MR. BLYHOLDER: Did I? Not public school, no sir.

The Member: Well, I just wondered. I have been there and gone through and know the value of it and I want to say that if the teacher is not willing to prepare to teach agriculture he ought to be relegated to the rear at once.

J. ALDUS HERR: Sometime ago we had the pleasure of introducing in East Lampeter Township, Lancaster county, agriculture in the public school, the first district in the county. Now there is not any class or any study that the pupils have taken to as readily as that. But our great trouble was, who was to teach it. Generally all of the teachers of the school would fall down at teaching, although many of them were brought up on the farm. Gentlemen, we better ask our normal schools where we are to get our corps of teachers from to put in our grammar schools to instruct in agriculture, so that our teachers come ably prepared to instruct. Now we have eight teachers in our township and I dare say that if you asked them separately they would hardly want to say that they were capable of giving instructions in agriculture. Now we want them. Had we better not ask our normal schools to instruct our teachers that they know how to impart that kind of knowledge?

A Member: I sympathize with Mr. Blyholder's remarks. I am a teacher myself, teaching twenty-four terms in the district schools, and I want to say that I have not had instruction in any one calling in the subject of agriculture. I have been born on a farm and lived there all these years and I have been teaching agriculture in Montour and Northumberland counties. I wish I had one of the boys here that I as a teacher have been unable to get interested in their school branches; but I have had that very boy take a hold of a question of balanced ration for the growing child, for the milk cow, for the driving horse or for the working man; and, in fact, that boy worked into the late hours of the night with the help of his father and worked out the balanced ration for the colt, for the boy and for the work horse; and if I ever saw a boy interested it has been that boy that would not take to his arithmetic or anything else; and I can teach agriculture in the public schools and I venture to say that the teacher that is interested in his or her work and cannot teach that subject had better be relegated from his business of teaching.

A Member: Mr. Chairman, I believe that the successful teacher is interested in his work, but I am dubious as to the value that will be received when the normal schools turn out machine-made agriculture teachers.

MR. A. P. YOUNG: The great difficulty with the teacher turned out from the normal school to teach agriculture will be that they cannot do it. They won't know how. If the normal schools will prepare themselves with a farm so that the pupils that they are turning out to teach agriculture can take hold of the tools with their hands and use them they will accomplish something like the question and will be ready to teach agriculture; but if they take nothing but theory they will be like the person who learned to swim, learned the theory of swimming, and when he fell into the water he drowned at once. He could not swim. Why? Because he had not learned how. He had learned the theory but he could not swim. Now you take a man out with a plow, no matter how good that plow or how smooth the ground, and tell him to plow the field and if he has never had the practice, although he knows the theory and he knows how to hold the plow, but he cannot plow that field without holding to the handles or having had practice at it. You cannot turn out teachers to teach agriculture from the normal schools as they are now organized.

MR. HUTCHISON: I am sorry I have no statistics here, but last year the State College conducted a Summer School to which they invited the teachers throughout the Commonwealth to come and I cannot recollect—is there anyone present who does—the number of teachers that came there and took that course last year, just lectures. They are inviting the teachers to come and receive this special instruction and they had quite a number there last Summer. That was when the College had its vacation. That big plant, representing a couple millions of dollars, was put into operation for the benefit of the school teachers of Pennsylvania to assist them in teaching agriculture. They had quite a class there and they taught them and have helped a great many of them. This year the Board has appropriated a certain amount of money that the Legislature gave them for the purpose of extending agricultural education and they are going to hold a similar school there this year where your teachers throughout the Commonwealth can come and receive that special instruction. I am sorry that Dr. Sparks is not here that he might take up this thread at this moment. I hope before we adjourn finally that there will be somebody present who will be able to present this subject in its true light. There is the place to get your instruction, where that great plant is located with all their advantages and their great corps of teachers to give this special instruction in the agricultural schools and subjects. But that is not getting back to the brother's question. He started in with the textbook. He wants to use this journal of our proceedings as a textbook and have it published cheaply and given to the scholars to read and study. That is the thought that Brother Blyholder gave. It is a question where these articles prepared by the different ones that appear before you would be the proper thing. I am afraid that the boys would soon catch me up on my grammar. The idea seems to be to put this material that we have been presenting here, such as my report, Brother Stout's able paper and the paper from the Forestry Department into their hands that the advanced scholar may read them and be posted on the subjects. Is that in your idea?

MR. BLYHOLDER: That is the point exactly.

A Member: I have been listening attentively to what has been said and I find a complexity of matters to be considered. As we look around here we see the forestry specialist; here is a man who has specialized in raising fruit and here is a man who has specialized along some other line. Now, all this is lumped up under the one subject of agriculture. You are going to ask the school teacher to make a study and be able to teach all these subjects. I do not believe a teacher, even one interested in agriculture, can go into the public schools and teach complete agriculture. I want to say that as a farmer, school teacher and as I hope a patriotic son of Pennsylvania, that such a teacher as that would be is absolutely worse than no teacher at all; because I know as it is at present that a great many things being adopted in the public schools have to be handled by the boy and girl before school hours and to them it appears like Josh Billings says: "A great many things we know aint so."

MR. STOUT: I want to say a thing, that we have too much curriculum in our public schools today. A great many of the boys and girls rising sixteen years could not tell you what the interest on \$3,000 for nine months is, and they are ready to leave our common schools and enter the high school. Our superintendent of railroads told me not very long ago they had a school connected with their railroad for scholars to learn telegraphy and they needed operators—and he put a single question to a number of the scholars in mathematics and that was, what is one per cent. of fifty, and there was out of two hundred about two answered the question. What do you think of your public schools today? What do you want to put anything more in for? I want to say that when you can learn that child to speak its own language correctly and write it correctly and make a proper calculation to do business in this world, you have laid the foundation of the education. If that child has any ability it will follow up and get your agriculture later on. Don't press it in the public schools too soon, because they have more than they can do now.

A Member: Mr. Chairman, I would like to say with reference to learning so as to use our language correctly that I listened this winter, at a county institute in Northumberland county, to a man on teaching the subject of language, and he told us how he could teach the pupil and before he got through with his address I noted mistakes.

Here is a supplemental reader. We can take this book we have here and teach it to our pupils. The pupils of our schools should know there is a meeting of the State Board of Agriculture in session at Harrisburg today, and how many do know? This book should be put in such form and published for distribution to the public schools of Pennsylvania and if given to me I will distribute it and I will teach it.

MR. GLOVER: As a teacher for eight years and a school director for five years I wish to speak on this question.

In Buffalo township, Union county, the directors adopted a textbook on agriculture for the eighth grade four years ago and it is

being aught as a regular study by our teachers in the two grammar schools and six ungraded ones. Some of the teachers are doing very good work while other teachers do not seem to take to it kindly though they teach it.

While visiting a grammar school a year ago the class in this study was reciting on "Bees" that day and they were greatly interested, and the teacher supplemented the text to make the lesson a valuable one. Then I spoke to the school on the Department of Agriculture, telling of the specialists who annually made reports on this and other subjects of interest to farmers and citizens of the State, to show them how the various resources of the State are cared for and developed, and all such reports made at the annual meeting were printed in a book and placed in the hands of the people to read.

Whether the reports and proceedings of this Board would all make suitable or interesting reading for the higher grades in agriculture may be questioned. But some of these reports would be suitable, interesting and profitable reading for advanced pupils who have completed the fourth and fifth readers, if the teacher would select the subjects which would be suitable, of interest and well prepared articles as most of these reports are. To take the report as a whole and read, it would not be a suitable book though it does contain much matter which pupils could learn by reading some of these reports or articles and learning something of agriculture and of this Board.

A Member: We are talking about educating the boy and girl for farming. Now, we are citizens here. I suppose most of us farmers and a good many of us have boys and girls. I know I have. Now, it seems to be conceded that every person is born for a certain purpose and if they carry out strongly that purpose they as a rule meet with success for their labor, whether it be as a farmer, store-keeper or clerk. Now, the theory is to get an education, and what we mean by an education is reading, writing, geography, and arithmetic. Those things are the main stand-bys. Now we come down and we arrive at the age of 18 or 20 or 21 when we start out on our own hook. If we have the education in that what are we going to do? How are we going to be a farmer? Some fellows have planned for their children. My brother had a boy, a farmer, and he went away to school and after he was there several years the boy came home and my brother says, "Do you want to be a preacher," and he says, no; and he asked, "What are you going to do? Whatever suits me. And he started on the railroad and he took pride in it and he now has a responsible position. Now, suppose you institute the education of the farmers. What I say is this; that you give the scholar the common school education and if he will be a farmer and farm he will pick that up himself. If he is going to be a clerk in a store he will pick that up. He has only got a start in this world—I mean a start to learn and then he commences to learn. And it is that way in farming. I am a farmer. I learned the carpenter trade and I am not afraid of any kind of business for the carpenter. I served twenty-one years on the farm when a boy, and after I have served that long on the farm, I am now getting back in the things and in the ways for farmers and I have to learn to do as much as when I started out farming when I was on the farm and was learning.

MR. JOEL HERR: We were wandering all around the subject and I don't know whether I know what the subject is. It seems that Brother Blyholder desires to introduce our proceedings as a text-book in the public schools. It may be all right to read if the teacher is competent to select the proper subjects and something with correct language. We have to set before the pupils something that is entirely correct in language and we would have to use choice language and a great deal of our exercises and proceedings of the meeting is not gotten up in the English it ought to be. But if the teacher is competent to select and pick out sections it would be proper and good reading. I take it the teaching of our children in the public schools agriculture is not to force the books in on them but to commence as early as possible to bend their minds in that direction and so arrange our text-books and have the right subjects introduced.

The Committee to wait upon the Governor, Messrs. Shaffer, A. P. Young and Wilson, here escorted his Excellency to the platform.

The **CHAIRMAN:** Members of the Board, I have the pleasure of introducing to you the President of our Board, the Governor of this Commonwealth, Hon. John K. Tener.

ADDRESS OF GOVERNOR TENER

Mr. Chairman, and Gentlemen of the Board, I hardly know what is expected of me at this time. You are probably in the midst of your business and interesting discussions and I do not want to inject my presence here especially or in any way that may distract from that and from your duties and the business of the moment. I do not know whether you want me to attempt to make a speech or extend felicitations or welcome you to the city and extend to you the keys of the government, but I am willing to do most anything, Mr. Chairman.

However, while I am on my feet and realizing that you do not expect from me any extended remarks, and neither is it my thought or my purpose to interfere with the regular business of this society today, I am glad, indeed, and I am not unmindful of the honor that is mine at this moment in being invited to come down and to meet with you here and to look each of you in the face.

I believe that we here in Pennsylvania enjoy an unenviable position and record and that we do not put our best foot front in those things and in those enterprises and industries in which we live. Other states lay their greatest claim to fame perhaps in the things that nature has very bountifully endowed them with. They claim for their state, perhaps, that it is the greatest state or best state because of the grandeur of the mountains or running streams or its climate; but here in Pennsylvania our greatest claim to fame is the accomplishment of our people; what our people do; the achievements of our people and the splendid citizenship that we have here. (Applause)

I am coming down to material things and what this State has accomplished. It is admitted, of course, that Pennsylvania is the greatest state in mining and in iron and steel industries; but we

do not hear so much about Pennsylvania as an agricultural state and yet each of you, I am sure, know that in Pennsylvania our crops perhaps average better than the average of the United States and that our fruit, our apples, perhaps, are of a quality superior to those of any other place in the United States, but this is not known generally, nationally or to the world.

You are here to consider, I presume, how you can better exploit and better apply what is known to science today for the enlightenment and betterment of the farmers in our whole community, and I hope that the outcome of this meeting will bring something that will be educational for the farmers throughout the State and that they may through the radiance of your good work here enjoy the knowledge that you obtain here today.

I want to thank you especially and again for the privilege which is mine and which I do enjoy. While I am neither a farmer or agriculturist at this time, I was born on a farm and my greatest delight, as I believe everybody's is who has red blood in their veins, is to get out in the open and get down close to Nature. It is especially pleasant at this time to be a farmer, because if he is an intelligent farmer, applies the scientific methods at your hands today, has the qualifications of mind and the knowledge of the treatment of your orchards and all that sort of thing and able to have the modern conveniences, you live in the midst of the same modern improvements and have them just as close at hand as the people who live in the city, and besides have the great advantages of the open country life.

I want to also say that whatever little influence my office possesses, where it can be of use to the betterment or to the furtherance of the objects and principles of this society and this association, it is at your command. (Applause)

Mr. Chairman, with your permission I will resign the gavel to you and ask that you proceed and continue in charge of the meeting while I remain here as long as I possibly can.

The CHAIRMAN: The next topic on the program is the "Production and Use of Barnyard Manure," by Dr. Charles E. Thorne, Director of the Ohio Experiment Station.

The SECRETARY: Mr. Chairman, I had a telegram from Dr. Thorne on Sunday evening saying that sickness in his family would render it impossible for him to be here. I wired him at once to send a good substitute and in compliance with that request Mr. R. C. E. Wallace, of the Ohio Experiment Station, is here and will take up the subject assigned to Dr. Thorne.

MR. WALLACE: Mr. Chairman and Gentlemen of the Convention: You have heard the reason for my being before you and it only remains for me to express Director Thorne's regret at being unable to be with you and talk to you at this time. He had intended to be here but the very serious illness of his son made it impossible for him to come.

Professor Wallace then presented his paper which is as follows:

PRODUCTION AND CARE OF BARNYARD MANURE

By R. C. E. WALLACE, *Ohio Experiment Station, Wooster, O.*

Barnyard manure is essentially a by-product of the farm. By many it seems to be considered a waste product to be disposed of with the least possible care and the greatest possible dispatch.

In the past farmers, in general, have not understood the real value of manure as a fertilizer and have innocently been losing hundreds of thousands of dollars every year because of the indifferent methods employed in caring for this important product. Fortunately, through the medium of our experiment stations and agricultural colleges, we are now beginning to comprehend the importance of manure in maintaining and building up the fertility of our soils.

Just what value manure may have as determined by its composition is difficult to say because of the wide variation in composition of the substance in question. These variations add to the difficulty in discussing the valuation, application and other points in connection with manure, and in order to assist in an intelligent study of the subject it will be well to consider briefly a few of the influencing factors.

Different kinds of animals: Each species of domestic animal produces a manure of different quality and different physical properties. Manure from cattle and swine contains a relatively high percentage of water, does not ferment or heat rapidly, and hence is classed as a cold manure. Horse and sheep manure contain considerably less moisture than that of cattle and swine, it ferments easily and is classed as a hot or quick manure. In composition the manure from horses and swine is somewhat richer in nitrogenous materials than is that from cattle, while sheep manure usually contains a higher percentage of both nitrogen and potash than do any of the others.

Effect of the ration: The total value of the manure produced by a given number of animals is largely dependent on the quantity and quality of the food consumed. From 50 to 90 per cent. of the fertilizing elements in the food is found in the excrement of the animals, depending on their age and use, hence the composition of the food determines in large measure the composition of the manure. Foods rich in nitrogen and mineral matter will produce manure rich in the same constituents, while foods poor in fertilizing elements will produce manure of corresponding poor quality. For example—animals receiving a ration consisting only of roots, straw, timothy hay and corn stover will produce manure of relatively low quality, whereas such materials as clover and alfalfa hay, cotton seed meal, oil meal, bran, corn and oats chop, etc., would produce manure of much higher value.

The kind and amount of material used for bedding also influence the composition of the manure. It is probable that straw is the material most universally used as bedding material and it answers

the purpose very well. It is cheap and abundant, and while it is low in the elements of fertility it is probably one of the most desirable materials to use for this purpose.

Care of manure: After having produced the manure the next thing is to properly care for it; and the first essential in this direction is to provide a water tight floor in our stalls, and covered manure sheds.

A few years ago the Ohio Station conducted some experiments in the production of manure, by feeding two lots of steers; one lot being kept in box stalls with cement floor and the other lot kept in similar stalls having only an ordinary earth floor; the object being to compare the value of the manure produced on the different floors. With the exception of the two kinds of floors all the conditions were identical. The steers were fed for a period of six months when it was found that the total value of the manure produced per thousand pound steer on the cement floor was worth \$2.25 more than was the manure from a similar steer fed on the earth floor. The experiment showed further that there was an actual loss of six pounds of manure per head per day on the earth floor as compared with that collected from the cement floor. This amounted to half a ton per steer, or fifteen tons for the thirty steers for the six months of the test. Taking the average analysis of the liquid excrement from this sort of animal and figuring this on the basis of fifteen cents per pound for nitrogen and six cents per pound for potash, we find that we have lost over sixty-five dollars worth of fertilizer; and a better fertilizer, too, than would be contained in three tons of commercial fertilizer which it would take at the average price per ton to represent an equivalent value.

A Member: Might we ask how often the stable was cleaned?

MR. WALLACE: About once a month.

MR. HUTCHISON: Were the animals allowed to be out in the open or kept continually in the stable?

MR. WALLACE: They were kept in the stalls and allowed to run loose.

Probably the most common practice of handling manure when it is removed from the stable is to pile it in an open barnyard. Here it is allowed to remain all winter long exposed to the leaching effects of rain and melting snow, and by the time it is applied to the fields in the spring about one-third of the nitrogen, phosphorus and potassium originally present, has been lost. This is not mere conjecture. It has been proven by carefully conducted experiments that fully one-third of all the fertilizing elements present in manure is lost when the manure is exposed for a period of three months in an open yard, due to the agencies of fermentation and leaching.

The practice of drawing manure directly from the stable to the field is probably the best method we can use in disposing of the manure crop. Where this custom is followed but one handling is necessary and the possibility of the losses occurring in open yard storage is entirely avoided. This method of caring for manure is, in fact, coming into somewhat general use, but it is not as general as it should be, nor as it will be when farmers come to appreciate fully the value of the practice. In cases where it is desired to remove

the manure from the stable once or twice a day, and where our live-stock equipment is not sufficiently extensive to produce a spreader load within this period, the manure shed becomes a necessary adjunct. This need not be an expensive structure but it should in any case be provided with a cement floor. Here the manure may be stored until a sufficient quantity has accumulated to justify its removal to the field; and by having the manure spread evenly over the floor of the shed and keeping it well packed by allowing the animals to run over it, no very serious losses are likely to occur.

So far we have been discussing the care of manure in its natural state only. We learn from a large number of chemical analyses, however, that manure in itself is not a well balanced fertilizer for our ordinary agricultural plants; that it is relatively high in nitrogen and potassium and correspondingly low in phosphorus. Experiments have been conducted by the experiment stations of Ohio, Pennsylvania, Illinois and other states which demonstrate pretty conclusively that the same element, phosphorus, is the one in which most of our soils is deficient. With these facts before us, this question naturally presents itself—"Why can we not, by taking proper care of our manure, retain practically all of the expensive elements, nitrogen and potassium, and by the artificial addition of some phosphatic material, thus supplying the lacking element, phosphorus, thereby convert our manure into a well balanced and more efficient fertilizer?" This question we have endeavored to answer at the Ohio station by an experiment which has now been in progress fourteen years. The answer has been that such a practice can be followed with very decided profit.

In the experiment referred to we have compared manure taken from the open yard with that removed directly from the stall to the field, each in its natural state and also re-enforced with a carrier of phosphorus. As re-enforcing materials we have used the ordinary acid phosphate and raw rock phosphate, both of which have proven to be equally effective; a very slight advantage appearing in favor of the acid phosphate.

A Member: Have you ever noticed any injury to the feet of cattle where acid phosphate was used in the manure as you suggest?

MR. WALLACE: No, sir, we have not.

A Member: Have you compared floats with acid phosphate?

MR. WALLACE: Yes, sir. Raw rock phosphate is the same as floats. We have found them to be nearly equally effective when used as I have indicated.

A Member: What would you think of applying the phosphate just before plowing; the manure having been previously applied?

MR. WALLACE: In the case of acid phosphate I should expect a fairly good result. In case you used the floats, however, I am not sure that the return would be entirely satisfactory the first year. In order to secure the best immediate effect we believe the floats should be in contact with the manure for some time previous to application.

A Member: What is your opinion and information on hauling manure right from the stable and putting on the ground when it is covered with snow?

MR. WALLACE: We should not advise spreading manure on top of a very heavy snow, because there is always a possibility of the snow going off with a rain in which case a part of the manure might be carried away by surface water. The danger from such loss is greater if the land is very rolling.

A Member: Were these experiments made on the same piece of ground?

MR. WALLACE: Yes, sir. They were made on the same piece of ground which was divided into three sections so that we had each crop grown each year.

The SECRETARY: I want to ask whether you would advise putting the phosphate material on manure stored in a covered shed?

MR. WALLACE: Yes, sir; by all means.

The SECRETARY: Is it effective in preventing fire-fang?

MR. WALLACE: No, it probably would not have much effect in that way.

A Member: Will it hold the nitrogen?

MR. WALLACE: Yes, sir; it will assist to some degree in conserving the nitrogen.

A Member: Do you think that floats are as effective as acid phosphate when applied to the ground separately?

MR. WALLACE: Our experience has been that the floats are much less effective when applied in this way.

A Member: Did you ever notice any difference in effect between manure applied in the fall and early winter in comparison with that hauled out in March?

MR. WALLACE: Yes, sir. The earlier applications have nearly always given the best results.

A Member: I have noticed that very materially. Was that the result of the early dressing or the crop that came after?

MR. WALLACE: Possibly both to some extent. I should be inclined, however, to give the major portion of the credit to the earlier application of manure.

MR. ALDUS HERR: We who are running dairy farms are obliged to clean our stables twice a day. I want to know what effect this ground rock would have if in cleaning our stables this morning we throw the manure in the manure spreader, haul it to the field and spread thinly over the ground. Would the effect be the same used in this way as if put in the shed or stable and left for a couple of weeks?

MR. WALLACE: We would hardly expect quite the same immediate effect, especially in case of the rock phosphate. Where stables are cleaned every day as you suggest we prefer to scatter the material in the manure gutters immediately after cleaning. The subsequent handling of the manure will result in the material becoming more thoroughly incorporated with it and will insure a more even distribution in the field.

A Member: When manure is not spread every day but stored in a bin would it be proper to re-enforce it?

MR. WALLACE: Yes, sir. Indeed it would.

MR. HUTCHISON: Mr. Chairman, I move that we have an intermission of five minutes to shake hands with the Governor, who will have to leave us shortly.

The motion was seconded, put and agreed to.

(Intermission.)

MR. MCGOWAN: The committee on legislation, of which I am chairman, will meet at 4:30 o'clock. This announcement was to have been made this morning.

A Member: I should like to ask whether manure applied to a wheat stubble field in clover would give a double benefit, in the clover and also in the corn crop following?

MR. WALLACE: Yes, sir. I should expect both the clover and the corn crop to be materially benefited by such an application.

A Member: How heavy an application of manure would you advise?

MR. WALLACE: That would depend somewhat on conditions. Experiments seem to indicate that, within reasonable limits, a relatively light application distributed over a larger area, will be more satisfactory than a very heavy application applied to a less acreage. Our custom is to apply from eight to ten tons per acre.

A Member: Have you any experience with top dressing after planting?

MR. WALLACE: So far as I am aware we have made no experiments along that line. However, I believe that such an application would no doubt prove helpful, to the wheat crop especially. Such an application should be thinly and evenly spread. Perhaps late in the fall after the ground is frozen would be the most desirable time to make the application.

The CHAIRMAN: Has the Credential Committee any report to make?

MR. RODGERS: The Committee on Credentials reports that Mr. C. H. DeWitt is elected a member of the Board from Tioga county.

The CHAIRMAN: Is there any action to be taken on the supplemental report of the Credential Committee or will we allow it to go over until tomorrow when we elect?

The SECRETARY: The others are to be acted on in the morning and this can be taken up with them.

The CHAIRMAN: Are there any announcements to be made at this time?

The SECRETARY: I might announce that the meeting this evening is to be a joint meeting of the State Livestock Breeders' Association, the Dairy Union and the State Board of Agriculture. It will be held in the large hall over in the Johnston Building. There is a hall there large enough to hold and accommodate one thousand people and there will be a very large meeting. It will not be possible for me to attend that session and I shall be very glad if I can be relieved and someone shall be appointed to act as Secretary pro tem.

MR. BLYHOLDER: I move you then that the Secretary be granted leave of absence and that Mr. Rodgers act as Secretary pro tem.

The motion was seconded, put and agreed to.

The SECRETARY: I am very glad, Mr. Chairman, that you have elected one who looks so much like me. We part our hair exactly alike.

The CHAIRMAN: Is there any other announcements?

The SECRETARY: I simply wanted to announce that there will be a question to be determined this evening as to who shall preside and what officers shall take charge of the meeting. The President of the State Livestock Breeders' Association is Mr. Norton, whom most of you know. He is from Waymart, Pa. The President of the Dairy Union is Mr. Stokes, from Hanover, York county, Pa. Our Vice Presidents, of course, will be there and you will enter into some amicable agreement with the gentlemen as to who shall preside. That is all.

On motion, adjourned to meet at 7:30 o'clock this evening.

Tuesday Evening, January 24, 1911.

Johnston Hall.

JOINT MEETING OF THE BOARD OF AGRICULTURE, BREEDERS' ASSOCIATION AND DAIRY UNION.

S. S. Blyholder, Vice President of Board of Agriculture, in the Chair.

The CHAIRMAN: The first topic on the program for this evening is the Report of the Veterinarian of the Board, Dr. S. H. Gilliland, of Harrisburg, Pa. Is Dr. Gilliland present? He does not appear to be, so we will take up the next subject: "Permanent Pastures and Meadows," by W. D. Zinn, of Phillippi, W. Va.

I now have the honor of presenting to you Mr. Zinn.

Mr. Zinn read the following paper:

PERMANENT PASTURES AND MEADOWS.

By W. D. ZINN, *Phillippi, W. Va.*

Ladies and Gentlemen: I think the Chairman said Professor when introducing me. I do not know whether to respond to that or not. I am a farmer, not a professor.

Friends, I am very glad to meet so many of the up-to-date farmers of Pennsylvania. I am sure you are all up-to-date farmers. They are the ones that attend the State meetings. As I look into your faces and see the interested expressions I appreciate being with you. That reminds me of a story they tell on a local preacher in my community. He always introduced his remarks like this: "My friends, I am glad to be here this morning, and I am very glad to see so many of you here." Finally he was invited to preach in the penitentiary and he began his remarks in the usual way: "My friends, I am glad to be here, and I am very glad to see so many of you here."

I am to talk a little while about Permanent Pastures. I come from an agricultural state, if you will permit me to call it such. You may think it a mountain state, a state of mountains and hills. We have them there. We do not have very much level land, and yet there are some places where you can find as many as five acres of level land unbroken by mountain or hill.

Only recently I attended a Stockmen's meeting in my own state, a unique affair. A gentleman who had been shipping cattle for about twenty years or more, shipping export cattle, gave a dinner. He had selected a show steer that he had bought, and having purchased forty thousand or more, and we had a real ox roast. I took a census of that meeting and I found those present (80 in number) represented five thousand seven hundred cattle; mostly export cattle. That is, these men there grazed that many cattle. Out of that number of cattle but twelve hundred were grained during the winter; the balance were fattened on the blue grass. I make this explanation that you can understand that we have some blue grass in West Virginia, but not as much as we should have, and we have not taken the care of it we ought. But we like blue grass, friends, because we think it is a pretty easy way to make a living, and we West Virginians don't like to work any more than we can help. They turn the cattle out in the Spring and see that they have water when they want it and that is about all the work many of the farmers there do. I know of farmers keeping one hundred cattle and not paying out as much as three hundred dollars during the year for labor. I have a neighbor, who was present at this meeting, and he represents six hundred export cattle that he finishes every year; and I asked him: "Do you grain any?" He replied: "No; if I cannot fatten my cattle on blue grass I will go out of the business."

But I am boosting West Virginia. Our pastures are sources of great income. Sometimes when I talk to farmers in other states they say, why land is too high to graze. You cannot afford to pasture one

hundred dollar-acre land. Let us see if we cannot. In France today there is a lot of land that rents for \$90 an acre for grazing. Now, they must keep some good stock on it. The reason why we cannot afford to pay high prices for grazing land is that we do not put the right kind of stock on it. If we graze on this pasture land the kind of stock that is grazed in France, viz., high priced breeding stock, such as they ship to us and sell at fabulous prices, then we can afford to pay \$100 per acre for good grazing land.

Our pastures in West Virginia, as well as in Pennsylvania, have been "running out." They don't produce as good as they did twenty-five to fifty years ago. In the meeting referred to I asked the question: "How many cattle can you carry now and how many did you carry twenty years ago?" Some reported that they only kept about one-third as many. There is something wrong. We understand at once why land runs out when farmed year after year. We know that the organic matter and the available plant food is exhausted, the land deficient in lime, and we have come to understand that the same thing happens with the grazing lands. Our grazing lands are deficient lands in organic matter and in lime, they having no available plant food, and we must take the same care of our pasture land as of the farming lands if we want to make them keep up their productivity.

Now it shall be my purpose to discuss the ways and means of doing this. We want to look upon our farms and our pasture fields as animated objects. The fact is they have or should have great deal of life. If you take your horse and work him without feeding for three, four or five days a week he becomes lean and weak, and if you don't begin to feed him he will die. We have been working our pasture lands for years and years and only giving them half rations and it is not any wonder they have become unproductive. Our fields must be fed; they must be clothed and taken care of just like the human body. If we fail to do that they will not give the returns they should. The Jewish law required that the land should have all that it produced every seventh year. I don't know whether those old Jews understood scientific agriculture or not, but they were practicing it. Every seventh year all that the land produced went back to the soil. For what purpose? To feed, clothe and make available the plant food for the next six years. Friends, I think we can improve on the Jewish method if we give the soil something every year. Let some organic matter get into the soil to make plant food available and that land will be productive for years to come.

There is no excuse at all for working out land. If you do not leave your farms better for your children than when you found them you have missed your calling in life. Our lands ought to become better; they must of necessity be more productive if the people are to be fed, because everything that we have comes from the soil, and in the future greater demands will be made upon it, for we are told in fifty years from now we are to have two hundred million people in the United States and all these people must be fed from the soil, so we want to take better care of it and give the land its share, no matter whether farming land or grazing land. If you are a tenant farmer you can rob your landlord year after year. I think I have had tenants to treat me that way. But if you are a land owner you cannot rob the land year after year without it resenting that kind of treatment. It will simply shut itself up to you and say: "You have not given me a square deal; you have robbed me and I

don't propose longer to give you a good crop." From these pasture lands you have been driving the livestock off for years. If it is a dairy farm you have been selling the milk off and in that milk there is a certain amount of plant food, and three elements that are found deficient in soils: nitrogen, potash and phosphorus. Whether we sell beef, mutton or milk we are taking available phosphorus from our lands. So, my friends, it is up to you to return this plant food to the soil in some way. It has been shown that many of our pasture fields have run out because the lime-content is too low. There is an acid condition in the soil and it is necessary if we wish to grow good pastures, to apply lime to the soil.

The question of lime is interesting a great many people at this time. We are just now wakening up to the fact that nearly all of our soils are deficient in lime. Over in my state a few years ago a farmer came to me who had a limestone field of seventy acres, lying all over it was limestone rock. His clover had failed in this field and he wanted to know what was wrong with his ground. I said: "I suspect your land is sour." He replied: "It could not be. There is limestone all over my land. It is actually in the way." I said: "Have you tested the soil for acidity; if not test it." The man got blue litmus paper and applied it to his soil and found a great deal of acidity in it and he applied five hundred pounds of granulated lime to the acre and the next year got a fine crop of clover and has been growing clover ever since. That proved that even these limestone soils are becoming deficient in lime and we have got to apply the lime and there is nothing under the sun that will take its place. I had a letter recently from a farmer who said: "I want to plant twenty acres of corn"—that letter was from this State—"and I am in doubt as to whether to use phosphoric acid or lime on the land. What would you apply?" If that land needs phosphorus there is nothing will take the place of phosphorus, and if it needs lime there is nothing to take the place of lime. Test your soil and supply what it needs. I also told him that the probabilities were that the land needed both the phosphorus and the lime, because most of the soils in our state—and that is largely true in this State—are deficient in phosphorus as well as lime. You have been selling the small grains off the farm and these grains have carried away a great deal of the phosphorus, and possibly the manure has not been saved as carefully as it should have been and you have been losing there and the soils are all deficient in phosphorus and we must supply it.

Going back to the lime question: There are various forms of lime we can use on the pasture fields. Where you have the limestone, as you have it up the valley between here and Hagerstown, all I believe you need to do is to crush that limestone and scatter it over the fields. It is the safest form in which to use lime, because you will not burn up the humus when you apply that ground limestone. There is danger, friends, in using too much caustic lime. That burns up the humus and you deplete the soil of fertility. It will become a stimulant for the time being, but it will leave the land worse than it was at first. Be careful what kind of lime you use, especially on the pasture fields, because you don't have the chance to treat them as you might other fields, and I recommend the ground limestone for the pasture land. Lime sweetens the soil by the particles coming in contact with the particles of soil, hence it would be a great deal

better and the sweetening process more perfect if you could plow that soil and mix the lime in because the contact would be more general. It may not be practical for you to plow up the field and put the lime on top of the land. If not, you can get good results from the lime by simply sowing it over the land whether you plow or not. Sowing it on the sod will correct the acidity to some extent but not as perfectly as if you plowed the land and applied the lime on top.

The other day I was told by a farmer, when I said you can get too much caustic lime. He said: "I have used three hundred to four hundred bushels of caustic lime on land and the land produced good crops for twenty years." I said: "How did you apply that lime?" He said: "We apply in this way: We put it in small piles and let it lie there from two to four weeks and then scatter it over the fields." I said: "You are not applying caustic lime. That is carbonate of lime." When burned lime is applied in this way it air-slacks, and air-slacked lime is carbonate of lime. That is the reason why Pennsylvania farmers have been so successful in years past in using so much lime. They have been using carbonate of lime and did not know it; actually so, because that lime became air-slacked and when taken into the soil was in the form of carbonate of lime and did not burn up the humus. It is dangerous, my friends, to put into the soil anything like three hundred bushels or one hundred bushels of caustic lime.

There may be various causes why our pastures become unproductive. As I have said, they may need lime, plant food and phosphorus. The dry weather may have caused the roots to die and the worms may have killed it. I have had all these things happen to my pasture land until I absolutely had no grass. What are you going to do then? If we could plow and reseed, the problem would be easy, but that is not always practical. I am going to tell you what I did. If it suits you, you can do it; if not, you can reject it. We go on to those fields and we harrow them. If the field is smooth we take a double acting cutaway harrow and that is the best I have tried. We cut it up pretty thoroughly so there is little or no sod left. That ought to be done as early in the Spring as possible, February if the ground is in proper condition for tillage; if not, later on. March will do, and April may do. May I think is too late as a rule. I put the lime on before I start the harrowing, sometimes with the grain drill, sometimes a lime spreader and sometimes with a manure spreader. And, by the way, my friends, there is no place on the farm that I believe you can get more out of the manure per ton, except the meadow than on the pasture land. I have come to this conclusion; that we have been putting the manure on the wrong crop for years. My practice formerly was to manure the corn ground directly ahead of the planting of the corn. I never do that now, unless I have more manure than I need in either of these other places. I can get the most out of manure on the pasture land, meadow land or on a soil improvement crop. If you are growing rye and you want to turn that rye down to improve the land you can get more out of the manure by applying it to that land so you have a good heavy crop to turn down.

I take the manure spreader and spread manure over this pasture field. Try a small acreage at first. If you have fifty acres, try five or ten acres, cut it off from the balance of the field. I use the woven

wire fence for that purpose. Apply the lime and manure if you have it. I have applied commercial fertilizer, but I will speak of that later, and then put on some grass seed. There is little or no life in that soil, no plants there; so you want to sow some seed and this is one very important question for the farmer to consider. Twenty-five years ago, when I was a boy, my father would send me out to sow timothy seed or sow the ground to grass and we never thought of sowing anything but timothy seed, especially for permanent pasture. I sowed about a gallon to the acre and then we waited about two or three years for it to sod up. Now it sods up the next year with weeds if you don't put useful plants there. I think timothy is a very poor plant to sow alone in the pasture. It does not last long; it is a soil robber. It feeds on the surface, still I use a little of it. I sow four pounds each of timothy orchard grass and red top to the acre. I don't know what you think about orchard grass. Some farmers say they would just as soon have broom sedge, but I like any kind of grass that makes the Winter shorter and orchard grass shortens the Winter. It stands late in the Fall and comes early in the Spring. So we sow a little orchard grass. Red top will grow in an acid soil. It will grow in a sweet soil as well. It will also grow in a wet soil. If any of that land ought to be tile drained it will pay to do it. It won't pay to grass wet land. The red top grows in rich land. Of course, all plants do. It will also grow in poor land. It makes the sod thick and for that purpose I like to mix some red top, say four to six pounds. Then I would put in some Kentucky blue grass.

It is the greatest of all grasses in the United States and if you have plenty of lime in your land I am sure you can grow it. I sow from seven to eight pounds of Kentucky blue grass and I would be sure that the seed would grow. A good many farmers do not like to sow it because they say the seed don't grow. I want to tell you what the trouble is in many cases. In Kentucky they gather the seed with a one horse stripper. They drive over the pasture lands in June and strip this seed off and put it in bags holding from eight to ten bushels. The farmers sell this seed often before they get it into the barn. The dealers come out from the city and buy it in the field and haul it to the railroad and ship to some warehouse and there it becomes heated and then we buy it and don't get any blue grass when we sow it. Since I have learned this I have been buying my blue grass seed directly from farmers in Kentucky, those who are responsible and they send me good seed and I have no trouble to get it to grow.

I would not stop with that because we have not put anything in the mixture that will add any plant food to the soil. Nitrogen is the only element of plant food that we can grow into the soil, and this is gotten there by growing some legume. I sow nearly all the clovers. I would sow at least two pounds of white perennial clover, that will stay in the land indefinitely; two pounds at least of red clover and two pounds of alsike clover. We know that alsike clover will grow in acid soil more than red clover and will stay long. It is a cross between the white and red clover and has some of the characteristics of the white clover, being almost perennial in its habits. You could mix mammoth, but these three would be sufficient. Mix these? No. Sow the clover seed by itself and the grass seed by

itself. If you mix them altogether and sow, you will not get an even distribution of seed because some of the seeds are heavier than others and fly out further. Then harrow the seed in. I believe in planting grass seed just as much as planting corn and there is no farmer that goes out and throws his corn on top of the ground. They always plant it and I believe these seeds ought to be planted. A good many farmers in seeding have been losing their crimson clover. They sow it but don't get a plant. Nearly everyone, upon investigation, have sown that seed on top of the ground. It is a large seed and possibly germinates and it does not get enough moisture until it withers and dies. That ought to be harrowed in. And so with most of the seed. We should harrow them over; a brush will do; anything to stir it in; and by all means have the seed-bed as good as you can get it, if you must harrow it over several ways.

There are fields in West Virginia from which the grass has died out and we cannot harrow them. The only thing we can do is sow some seed over them. Some of them ought to be reforested and, in fact, I believe that some fields in Pennsylvania should be left go back to forest or have trees planted on them, locust or something else, because they are not worth taking care of and will never make good pasture lands.

Now these plants will need some fertilization, some available plant food, and before I harrow the land the last time I use some commercial fertilizer, and on the character of the soil, my friends, should depend largely the kind I would use, and by kind I don't mean any brand. I am asked: "What brand of fertilizer do you use?" It does not matter about the brand. There are a great many farmers, it is true, up in West Virginia that buy commercial fertilizers by the smell. If it has a strong odor they say it is the very kind of goods they are looking for. It may be worth five dollars a ton. Again they actually buy for color; if it has a good dark color that is the thing they want. I met one of these fellows coming from market with a load of fertilizer. I asked him what he paid for it. He said he got a confidential price on that and he promised the dealer not to give him away. I am always afraid of these confidential fellows and I began to insist on his telling what he really paid for it. The analysis was this: One per cent. of nitrogen; seven per cent. of phosphorus acid and one per cent. of potash. I figured that it was worth about ten dollars or ten dollars and sixty cents from the commercial value of phosphorus, nitrogen and potash. After I had insisted that he tell me, he said he got it for nineteen dollars a ton and that the dealer had sold it regularly for twenty dollars. I said: "You are the fellow who should not want to tell anybody you paid two prices for the fertilizer." There are a lot of farmers doing that. We are buying even what our land does not need. If this pasture land is heavy clay soil and has a reasonable amount of vegetable matter in it you don't need potash. I don't need it on my fields. I have asked my fields what they need and this is the best test and only correct test when we ask the land. The chemist cannot tell you. He can analyze the soil and tell you how much phosphorus, nitrogen, humus and lime there is there and a lot of other things, but he cannot tell you how much is available. The farmer must ascertain that himself; and I found I did not need potash and nitrogen on my soil when I asked the

land what it needed by checking it and by putting on one plot the fertilizer and on another nothing, and I found my land only needed phosphorus. I did not get any appreciable increase by applying nitrogen and potash on the clay soils. I am not speaking of sandy soils where you may need some potash. In all probability on the clay soils you only need to apply phosphorus; you may need nitrogen. And I would say after you have sown that crop you can tell to the line where you applied the phosphorus. I put on one hundred pounds of nitrate of soda on the grass after it is started up well. That will nourish it until the roots run out and get plant food to grow it. It is one of the best things to put on the grass started on timothy meadows. The land may need nitrogen and I believe in that way by applying at the time of sowing a mixture of potash and nitrate of soda, tankage and fish scrap or something of that kind so that it gradually becomes available.

Another thing we want to remember in applying fertilizer on plowed ground is, that potash and phosphorus become fixed at the point of contact. If you apply on top of the land and don't harrow it afterward, the danger is that it will become fixed at the surface; so you want to stir the soil. I harrow thoroughly to get it down. Fixation takes place within twenty-four hours after application.

I have said nothing about permanent meadows. How many have permanent meadows that you don't plow? I want to see if there are any farmers who have them. Quite a few. I think, my friends, that we ought to have just as few of them as possible. Really, I don't believe very much in permanent meadows, and yet there are farms on which we must leave a certain piece of ground to meadow indefinitely and they must be fed like the pasture field. There is not an acre of ground that pays better on my farm than my meadow lands because they produce heavy crops of clover and timothy hay. We get from twenty to twenty-two dollars a ton for it. Some farmers have meadows they wish to maintain. Those meadows run out for the same causes that the pasture lands run out. They need feed. Some of my neighbors have been following this method: They cut up the meadows immediately after harvest and reseed—and there is no better time to do it if the season is right. The mixture they use is timothy, red top and clover, alsike and red clover. They sow a little commercial fertilizer because they want a good growth and we must get it ready to go into winter. If you have manure you can apply it. The farmers have been flattering themselves that they were giving back to the soil all they took from it, but they were not. They were robbing it every time by pasturing it too closely. This we ought not to do. We have been grazing too closely. When I began the business of farming I began with a mortgage and I went out and bought sheep and turned them into the grass I had left in the Fall. I would have better carried the mortgage longer. You cannot afford to graze your meadows closely. In fact, I don't believe a meadow ought to be grazed. I believe the ideal way of handling a meadow is to take the first crop off and then, unless the other crop is large, let it go back to the soil, covering up the land and making available plant food and furnishing matter to the soil to grow the crop next year. When we cut the hay and haul it off we should put the manure back or apply commercial fertilizer and feed that meadow. We ought not to expect it to do well unless we feed it regularly. I

have a neighbor that top dresses his pasture lands every third year with acid phosphate, two hundred and fifty pounds to the acre, and he has some fine cattle and some fine pasture.

The CHAIRMAN: Have you any questions to ask Mr. Zinn? You have an opportunity to bring out any thoughts you want.

A Member: I would like to ask if you would prefer plowing to harrowing the worn out meadows?

MR. ZINN: Yes, sir; but I take it a great many have pasture lands you do not want to plow at all, as we have in West Virginia. I would always plow if the land was right so that it could be plowed and prepared in that way because you can do a better job and turn under any cover crop like plowing down some rye and increasing the organic matter in the soil. Where you cannot do that, the harrow is the next best thing.

A Member: Would you recommend the clipping of the second crop of clover or let it grow?

MR. ZINN: No; I would not let it ripen the seed. When a plant ripens its seed it has fulfilled its mission in the world and that is the reason the farmers don't get a good stand if they wait until it ripens its seed before clipping.

A Member: Certain of our permanent pasture fields become infested with growing weeds. How do you treat that?

MR. ZINN: Now, my friends, I believe this: I don't know whether our scientific friends will agree. I believe the soil's natural preference is to grow useful plants rather than weeds if conditions are what they should be. Weeds come because the soil often needs lime. I saw that in Ohio. A farmer had sown timothy. The field had been covered with broom sedge before that. At the time of seeding to timothy he took the manure spreader and drove promiscuously over the field and scattered the lime right and left over the field and two years after that I could see the tracks made by the horses in going over the field. There was no broom sedge there. The lime had not driven the broom sedge out. It increased the growth of the timothy to such an extent that the broom sedge was crowded out. If there is enough available plant food in the soil we are not going to be troubled with weeds much.

A Member: Which is the cheapest way to put on lime, either the hydrated, the ground limestone or burned lime?

MR. ZINN: That depends very much on what it costs you. Hydrated lime, my friends, has a wonderful reputation. The manufacturers are doing just like food manufacturers. If I was selling hydrated lime I might do as the others do. Remember hydrated lime is forty-four per cent. moisture. The only advantage over the air slacked lime is the even fineness and in mixing the soil contact will be more perfect. If I can buy the ground limestone at one-half the caustic lime would cost me I would say certainly use the ground limestone all the time. Sometimes we have to ship too far and then we buy caustic lime and sometimes we allow it to air slack and put it on as carbonate of lime. The distance of shipping and

distance to haul has a great deal to do with it. Remember that one ton of ground limestone is the equivalent of eleven hundred and twenty pounds of caustic lime, so figure on that basis the paying price.

A Member: I would like your thought on using red top, which is sometimes considered a weed.

MR. ZINN: I like to use the red top in that timothy because it will make the timothy finer and heavier and will help to hold the weeds down. And then the second reason I use red top and other grasses in the pasture land is, that it furnishes the stock a variety of food and that is absolutely necessary. I am very fond of corn bread, but I am afraid if I had to eat it three times a day for thirty-six days I would get very tired of it; and so it is with the animal. It would soon tire of one food all the time. Did you ever sit on the fence and talk to your cattle? It will pay you. If you sit on the fence and watch them eat. When they are full of grass they will bite off a weed. I want to satisfy that appetite by sowing a variety of seed and I will do that when I sow nearly everything I can get in the form of grass seed on the field.

The CHAIRMAN: Is Dr. Gilliland present? Dr. Gilliland is to make the Report of the State Veterinarian, but he does not appear to be present so we will take up the next subject on the program, "The Pennsylvania Stallion Law," by Dr. C. J. Marshall.

DR. MARSHALL: Mr. Chairman and Gentlemen: I was requested some time ago to give you something on the subject of the Pennsylvania Stallion Law. I wondered why they asked me to speak on such a subject. I know there are a great many here that know a good deal more about the Stallion Law than I hope to. I have had an opportunity to be interested in it a little. I think in January, 1908, the Pennsylvania Stallion Law was instituted in this State and it has been making good progress since it was in effect. Dr. Gay, the man who has had charge of the work, is very much interested in it and I doubt if we could get a better man in America to take charge of the laws of this character. So far as I know, there has been very little trouble in instituting this law or in the workings of it. There has not been time enough yet to reap all the advantages we should from it. I imagine in the future you will appreciate it much more than in the past.

I have prepared a few remarks here. It is well to get down the subject and if you will excuse me I will read them:

THE PENNSYLVANIA STALLION LAW

By DR. C. J. MARSHALL, *State Veterinarian.*

The stallion law has now been in operation for three years and in that time has been able to demonstrate both its strong and weak points. That much good work has been accomplished can readily be shown, and that amending the law would still better the horse breeding industry is a foregone conclusion.

Primarily the law has been of great educational value. Heretofore in many instances farmers bought stallions without considering whether they were registered or not. As long as the seller made a statement to the effect that a horse was pure bred and registered the buyer was satisfied. Advertisements such as "An Imported English Shire Stallion Registered in France and America" (this fact was actually printed on a stallion poster) demonstrates that the owner evidently did not know what pure bred and registry meant. Now, however, they realize that in order to secure a pure bred license they must have an authorized pedigree registry certificate, and they have become far more careful.

The requirement of the law which states that copies of the license certificate shall be posted prominently on the inside and on the door of the stable in which the horse is stood, and that a copy shall be incorporated in all advertisements is a good means of preventing misrepresentation by the stallion owners themselves; because the license certificate differentiates distinctly, in large type, between pure bred and grade. Thus, a prospective breeder immediately on viewing the license certificate can see whether or not the stallion is of pure breeding and registered, or whether he is a grade.

I do not believe there is any business in which there is more trickery than in horse dealing, and for that reason it is necessary for breeders to use an extra amount of caution. Many men who are otherwise honest do not hesitate to deceive even a friend when a horse deal is being negotiated. Fraudulent pedigrees and pedigrees from unauthorized associations were a very common occurrence but now, knowing that they will not be accepted as a means of securing a pure bred license they are less frequently found.

The Bulletin issued by the Department on horse breeding topics have also been a great help to stallion owners, in fact horsemen in general. However, they have no immediate bearing on the subject of this paper.

The stallion law has encouraged breeders of good horses by giving them protection and they have in consequence been buying more pure bred stallions than heretofore. To show the actual increase let us take the number of pure bred horses licensed in 1908 which was 666, then in 1909 there were 823 licensed, an increase of 10 per cent., and in 1910 there were 909 licensed, an increase of 10 per cent., while the grade stallions have also been increasing the percentage of the increase has been markedly less. In 1908 there were 1333 grade licenses issued, in 1909 there were 1427, an increase of less than 7 per cent., and in 1910, 1474 grade stallions were licensed, or an increase of only $3\frac{1}{2}$ per cent.

The ratio of increase has been about three pure bred stallions to every grade. Not only have the pure bred stallions brought into the State increased in numbers since the enactment of the stallion law, but the horses have been of a better type, especially among the draft stallions.

The present stallion law is good so far as it goes, but under its provisions it cannot go far enough. The owner's affidavit is a bad feature, but it is impossible to demand that each stallion owner have a veterinarian examine his horse, as in some counties they have no qualified veterinarian. The only means of being sure that a stallion is up to standard is to have a commission appointed which shall ex-

amine all the stallions in the State, similar to the way it is done in New Jersey. This would be an ideal means of having all horses passed upon in a uniform way. As it is, there is too much difference of opinion as to just what constitutes a stallion of the best type. This inspection would also bring to light all valueless grade stallions, which although technically sound, are of such inferior breeding, type and conformation that they are a detriment to the horse breeding industry.

A stallion would not necessarily have to be examined each year he is in the State. This could be modified; perhaps stating that all stallions had been passed by the commission and had attained the age of say 10 years would be exempt from further inspection.

Then, too, instead of issuing merely three forms of license certificate, namely: pure bred, grade and cross bred, it would be better it seems to me, to have some distinction between pure bred stallions at least. There should be a class for pure bred stallions of the highest type, second best and so on. This would give the mare owner a better idea of the worth of a stallion. As the law now stands any horse that is properly registered with an authorized association, can secure a pure bred certificate; this puts a prize winning stallion in the same class as a horse, which (although by the letter of the law is entitled to the best certificate) is inferior as to type and conformation. These kind of licenses, however, could not be issued unless a personal inspection were made by the authorities in charge of the enforcement of the law. If the commission before mentioned were a fact, of course, it could also take care of classifying the various stallions.

The Pennsylvania law is one of the few exceptions, in not having a lien clause in it. Eight states, and one of them is Pennsylvania, have no lien on the colt or mare and colt, for a stallion service fee. A clause of this kind in the law would not only encourage breeders to buy better stallions, knowing that they would be able to collect the fee agreed upon, but also, would be an excellent means of enforcing the law. If a lien clause were incorporated in the stallion law, stating that only such stallion owners as had complied with all the requirements of the law, could avail themselves of the right to collect fees under that law, it would naturally make all stallion owners very desirous to fulfill all the provisions of the law.

Much criticism is made in regard to the fact that there is no specified list of hereditary unsoundness in the law. This fact, however, was gone over in detail by your committee at the meeting two years ago. Since that time Dr. W. L. Williams, of Cornell, read a paper at the annual meeting of the Pennsylvania State Veterinary Medical Association which confirmed in every sense of the word the report made by your committee on this subject and brought out more forcibly the importance of allowing great leeway in the subject of hereditary or transmissible unsoundness or disease. There appears to be no condition in the list of those usually considered as hereditary unsoundness without illustrious exceptions.

After all the subject of type and conformation appears to predominate most prominently in the subject of transmission, and while we would not recommend prospective buyers to purchase stallions that are afflicted with blindness, ringbones, spavins, navicular diseases, cryp torchidism, roaring, heaves or sidebones or breed to such

sires or dams; yet where horses develop these conditions during service, the law should deal with them leniently and clients should not be too critical.

The CHAIRMAN: Is there any question to be asked or discussion on the subject before us?

A Member: I would like to ask if there is any objection to breeding to animals after they are ten years of age?

DR. MARSHALL: This gentleman asked me once tonight if there is any reason why we should not breed to a stallion that developed roaring after ten years old. I don't think there is. I don't want to be understood as recommending you to breed to roaring horses, but there are a great many good horses that develop roaring and I don't believe transmit it. There are a great many cases in which we get information in and where the breeders have investigated the question of transmission of roaring it was the exception where they could find a case where roaring had been transmitted.

These good draft horses that in the winter develop asoturia, they are horses of good conformation, good condition and good age, and every condition favorable, are what we want and the best kind of horses. They develop asoturia and they usually die with it, but I don't think that is any argument why we should not breed for that conformation and try to breed for that class of horses. I would say that it is not a dangerous experiment to breed to horses that develop roaring after ten years of age.

MR. NORTON: Would you recommend cutting out the grade stallions?

DR. MARSHALL: I would as fast as we could get pure breds to take their places. I don't think I would recommend cutting them out at once.

MR. NORTON: The reason I asked that question is that there are a great many owners of stallions come to the conclusion that in order to protect the pure bred and thorough bred horses the grade horses should not be allowed to be registered.

DR. MARSHALL: I think we should encourage in every way the pure breds and thoroughbreds and as fast as we can adopt that kind of breeding. I think it better to get rid of grades. I don't see any other way we can get at it.

A Member: Isn't it a fact that we have many grades throughout the Commonwealth that are better than thoroughbreds?

DR. MARSHALL: I think that may be true.

A Member: Why would you advocate a measure that would cripple that feature of the industry?

DR. MARSHALL: Well, I don't know that it would cripple it. I think it is a benefit to get work horses from pure bred sires rather than from grade sires. We should get better horses. I don't see or understand that that recommendation would cripple the trade.

A Member: Well, it would have more or less effect upon it if we go so far as to prevent such a stallion from being registered.

DR. MARSHALL: If I was going to breed horses I would want to get the best I could, and even then I would want the registered horse if I knew he transmitted his qualities.

A Member: What proportion of light, medium and heavy draft stallions are there in the State?

DR. MARSHALL: I don't remember just how those proportions run. There are a great many more heavy draft horses being brought in. There are not so many thoroughbred stallions in the State; and I don't think there are a great many standard bred cart horses. I think the tendency is more for draft horses than thoroughbreds.

A Member: How do you prevent asoturia?

DR. MARSHALL: I don't know as we can always do that. I think we can sometimes. The best preventive measure that I know of is to cut off the feed when heavy strong horses are standing in the stable and always give them a little exercise. Don't leave them standing in the stable on a holiday and Sunday together with the same amount of feed. If you can give them twenty minutes exercise and cut down their feed one-third or one-half I don't believe there is one case out of a hundred that asoturia will develop.

A Member: Doesn't it develop oftener among the class of horses men are allowing to stand to get ready for Spring trade?

DR. MARSHALL: That may be the way in the country, but in the city it is most always horses worked hard every day. Then there comes a Sunday with a holiday ahead or back of it, to make two days that the horses stand in and they naturally get the same feed as when out at work and a great many get paralyzed and usually die. I believe in the country you don't have so much danger of dying. In the country districts they tell me they get well frequently, but in the city we usually have a dead horse when we get one paralyzed in both hind legs. The exercise and cutting down the feed are the best preventive measures.

A Member: Will a horse get enough exercise in a large box stall?

DR. MARSHALL: Not enough to prevent asoturia. That will help some.

A Member: Cutting down the feed is it?

DR. MARSHALL: Has more to do than the exercise. Cut the feed out entirely and big fleshy horses will be better off if not fed at all when standing in than if fed.

A Member: What would you give a twelve hundred pound business horse used in the summer but with not much to do in the winter?

DR. MARSHALL: Give him some hay.

The CHAIRMAN: Are there any other questions? If not, is Dr. Gilliland present? He does not appear to be.

MR. NORTON: I will make a few announcements and then we will call on someone else.

Tomorrow morning the State Board of Agriculture will meet in the auditorium over at the Board of Trade. The Pennsylvania Livestock Breeders' Association will be at the South Chestnut Street Market. The Pennsylvania Dairy Union will meet in this room. The Horticultural Association will meet in the upstairs hall at the Board of Trade. The livestock demonstration will be at the South Chestnut Street Market Hall. Tomorrow all of the livestock meetings will be there in the way of demonstrations of beef cattle, dairy cattle, horses, sheep and hogs; and the steer and hog that are to be used in the meat demonstration Thursday afternoon will be killed tomorrow afternoon, and the demonstration of the cut carcasses will be here in this room on Thursday afternoon.

The CHAIRMAN: Are there any other announcements to be made. If not, I see a gentleman in the rear of the hall I know you will all be pleased to hear from, and that is Prof. Agee, of State College.

PROF. AGEE: I appreciate this invitation. You have a full program this evening and I am sure that you do not want to hear from me at any length. I am glad that associations, representing special interests in Pennsylvania agriculture, have finally arranged to hold their meetings during the same week of the year and at the same point in the state so that all of us may get into touch with each other. This is the way Ohio has done for a long time, and great good has resulted.

I am sorry that I did not hear my friend Zinn discuss the subject of permanent pastures before you this evening. I should not say anything about making sods as I did not hear Mr. Zinn, but you will allow me to emphasize the truth that good, heavy sods are the stepping stones to agricultural prosperity in our state. We can make such sods, and I know that he told you how he is doing so on his own home farm. Pennsylvania is adapted to grass and when we fertilize the hills of this state we can have sods. Our farmers continue to ask about fertilizer for corn. When land is thin and must be planted with corn, of course fertilizers should be applied; but the right place for commercial fertilizers is on the land seeded to grass. We can seed grass so liberally that the sod will make a big corn crop, and we can do this with double profit. When land is seeded down it should have liberal fertilization, and if the sod is left more than one year for mowing it should receive a heavy application of fertilizer early each spring. We have tested this out on thin land at State College, and it is one of the best object lessons our Experiment Station now presents to the farmers of the state.

I presume that Mr. Zinn advocated the use of lime on all soils that are acid. In Pennsylvania, three-fourths of the farming land has a deficiency in lime. If we do not meet the lime requirements, the grass and clover plants are not properly fed, and we do not get the sod that gives pasture any hay; and we do not get the organic matter for the corn crop that follows.

I hope that you expect me to say something of our School of Agriculture at State College, as I can not afford to stand before Pennsylvania farmers and not mention this work which seems to me so important. We have 625 students in Agriculture at the College

now, and next year we will have 800. Many of these men are going back to Pennsylvania farms. Two hundred and twenty-five of them are taking courses that lead only to practical farming, and a considerable percentage of the remainder are planning to own farms and live upon them just as soon as they are able.

A Member: What are you doing for the girls?

PROF. AGEE: We have a Domestic Science School that can train a girl so that she will be as good a home-keeper as her mother is. She can do her work better because she will know more about sanitary laws and more about chemistry. Why should our Pennsylvania farmers send their daughters to schools that do not prepare them for the practical work of life? They have a right to a knowledge of the science relating to home-keeping just as well as the boys have a right to the science that relates to agriculture. We now have only thirty girls in our Domestic Science School.

A Member: You ought to have 625 to keep up with the boys.

PROF. AGEE: Well, you must count upon one or two of the fellows not being the right kind of material for husbands, so we will say that 623 girls would be about right. They should be in the school and we should send them there. The girls have a right to vocational training. It is not square to them to give only such training that they must go into the school room year after year, instead of being fitted for the world's work so that fellows on small salaries can afford to marry. When our young men come to my office to talk about the work that they should engage in, I say to them: "You should look ahead to the time when you will make a home. That is what you are working for no matter whether you realize it or not. It will only be a few years until the best thing in your life will be a home of your own, and you should plan your life work with this in view. If a girl has not been trained to work with her hands and believe that home-making is wholesome work, the question of the college man making a home can not be solved.

I would not have you think that I am pleading for The Pennsylvania State College. I am interested only in the young people who should have the training that will make them worth while in this world, and State College is the opportunity because it furnishes vocational training. If it did not do so, it would not deserve any special consideration.

The CHAIRMAN: Now we would like to hear from Prof. Van Norman.

PROF. VAN NORMAN: It is gratifying to us who have been struggling with educational problems in agriculture to see the interest and enthusiasm that is being awakened in our lines. When I left Indiana and came here five years ago there were fourteen students in the four year course and fifty-two students in the winter course, making sixty-six students that first winter in Agriculture at Pennsylvania State College. Some of my western friends called me a fool for coming to Pennsylvania. I told them that the clouds were gathering, the storm was due; it was going to come no matter who came here. The storm came; the boys followed the storm into the college, and they are still coming.

I believe, looking at the opportunities in agriculture today, that they are big because it takes a bigger man to be a successful farmer today and the next ten or fifteen years than it has during the last fifteen years, and the boy who goes into the business of farming during the next fifteen years with no better training than you who started 25 years ago is not going to get along as you have, because the conditions have changed and the man who meets those conditions must be better equipped. He must have a better knowledge of the principles of agricultural science that underlie the whole field of farm work and must have a better understanding of what they call business principles. The rapid development of this great country of ours has been made possible because of two or three things: One of them is organization and another is knowledge of the cost of production—bookkeeping, in other words; and I believe our successful farmers of the future must know more of how to keep account of what they are doing. I have had men come to my office and say a certain line of work was not paying, but they could not give the figures to prove it so that they might be sure of it. It takes a good deal of figuring and head-work and wise skill to succeed in any business. I believe the opportunities in the business of farming before the young men of our State today are immense.

There is another side to this that has not been brought out. We have in this great State thousands of men who in the years gone by left home and went into the city to study law and medicine and the manufacturing business, and now the good father and mother they left on the farm have gone on and they have inherited the farm and they are writing to us up at the College to send a man down to the farm and bring that farm up in productivity, and we do not have men enough. There are forty-two men in my class today and only four looking for a job. I want one but I have seven men that want the other three, and yet there are thousands of boys in this State of Pennsylvania that could equip themselves to take charge of these farms and get the experience at the other fellow's expense, yet render full value for salary received. That is why I stick to the College—all the mistakes I make the State pays for. If I ever get enough money saved up to buy a farm I will take hold of it. And the fellow that runs the other fellow's farm is going to get a lot of experience more or less at the other fellow's expense. There are thousands of boys competent to carry on these farms and render good service if to their practical experience they will add the training that they can get at our college or some other. You must know boys working out at fifteen to twenty-five dollars a month and many of them at ten dollars a month, who, if they would equip themselves to fill these places could make good, and increase their earning power several hundred dollars per year.

THE CHAIRMAN: We would like to hear now from Dr. Marshall, our newly appointed veterinarian.

DR. MARSHALL: I hardly know what to say. I have undertaken a work I know you are all interested in and I want to serve you the best I can. It will be my aim to carry the work on as it has been organized and do the work to the best of my ability. In any way I can assist any of you in doing this, just call on me and see what I can do. I will try to do my best.

I presume you all knew Dr. Pearson and knew a lot about the way the work was organized and you helped him organize it. I know this Breeders' Association is one of the biggest backers that the State Livestock Sanitary Board has ever had and many of the members have assisted the State Livestock Sanitary Board in every way; and if I have to call on you for assistance in the future I hope you will be as prompt to respond as you did with my predecessor.

I do not know that I can say anything more. I will just repeat, that if there is any way that I can help you just let me know.

The CHAIRMAN: Now, gentlemen, I hope you will all take advantage of the show or displays that are upstairs. I know they are worth looking at and examining and studying; and all bear in mind the meetings that will be in session tomorrow morning.

With that, you are excused for the evening.

Wednesday Morning, January 25, 9:00 A. M.

John C. Weller, First Vice-President, in the Chair.

The CHAIRMAN: Gentlemen of the Board, you will please come to order. We are now ready to receive the Report of the Committee on Poultry, W. Theo. Wittman, Chairman, Allentown, Pa.

MR. WITTMAN: This report may be rather short, but I don't want you to judge the chicken business merely by the smallness of the paper. This is my first report.

Mr. Wittman then read his report as follows:

REPORT OF THE COMMITTEE ON POULTRY

By W. THEO. WITTMAN, *Chairman.*

Never, within the history of the State of Pennsylvania, has there been such a widespread and insistent interest in poultry and poultry keeping as has been manifested within the year just past. Probably this is the result, partly, of the ever continuing, upward trend of the already high prices poultry and poultry products demand; thereby calling attention to and emphasizing the profits probable and possible in poultry keeping; partly, of the aggressive and widespread advertising in all classes of current publications, (from the small country weekly up to the highest priced of the biggest dailies and magazines) of poultry and poultry keeping; partly of the widespread awakening in the cities and towns to the desirability of country living, and the idea of these that by keeping a few chickens the entering wedge of a livelihood in the country would be solved; and, partly, by farmers being today more thoroughly awake than ever to the

fact that the biggest money profits are possible in specialty farming as against general farming, and that poultry keeping may be an easy and profitable specialty farming.

The people of Pennsylvania, together with the rest of the country, have spent individually small, but in the aggregate, what must be large sums of money, in buying so-called get-rich-quick "systems" of poultry keeping within the year just past. They have spent this money not altogether because these systems promised wealth unbelievable, but because they really wished information on poultry-keeping and knew of no other source to get it. If the State of Pennsylvania could or would get out an up-to-date and trustworthy bulletin on poultry keeping and give it some publicity, it is more than likely that over a hundred thousand copies would be applied for within a year.

Poultry keepers have been very slow in taking the initiative in securing legislation for bettering the conditions of the poultry industry. But, there is a change of sentiment now going on and it will be a matter of only a few years when poultry people will not only seek, but demand poultry class legislation. One of the signs of this, is the enormous gain in membership within the last year of our National Poultry Association, the Pennsylvania Division of which has alone added, since last September, over one hundred members at ten dollars each. The avowed purpose of this gathering together of the poultrymen is for the purpose of *doing things and getting things*.

An encouraging sign is securing within the year past large appropriations for the encouragement of poultry keeping from various State legislatures, notably, our sister state of New York; and of the Western state, Missouri.

It is to be hoped that Pennsylvania with its large army of out-and-out poultry people and its vast poultry product, both utility or market, and pure-bred or fancy, will not lag behind the other states, but that poultry will receive its due share of fostering care and enouragement from the State and the State Department of Agriculture. To this end, Pennsylvania should have a Bureau of Poultry Husbandry as a Division of its Department of Agriculture. Should have at State College a poultry plant and equipment worthy of the institution and State, and not as now, a plant and equipment which brings a blush of shame to the face of any well informed poultrymen or one, no successful poultryman would be willing to take, rent free.

Pennsylvania includes within its borders thousands of breeders of pure-bred poultry, a few, at least, with a world wide reputation for the high excellence of their stock. Also, held the last year close to one hundred poultry shows, including some of the best and biggest shows in the country, as at Philadelphia, Pittsburg, Scranton, Williamsport and Allentown. The total paid attendance at these Pennsylvania shows must have been upwards of a quarter of a million. And yet the percentage of pure bred poultry on the farms of Pennsylvania is as yet relatively small. Although our dung-hill, mongrel poultry is utterly out-of-date and worthless; and when found on a farm at once stamps the owner as unprogressive and careless, it is my painful duty to report that I found such poultry, within the year, on the farms of some of the members of this Board.

There has been great activity in this and neighboring states within the last year in prosecuting dealers in "Rots & Spots" in eggs and in formulating the general idea that cold storage eggs were bad eggs.

And while Pennsylvania certainly wants the enforcement of the law against rotten eggs, it also wants inspectors with discretion. Cold storage of eggs is the great equalizer of prices; making possible the profitable returns to the producer of summer eggs and saving great loss, and in keeping the price of some, winter eggs, at least within the reach of the working class. It is fair to suppose, that, eliminating cold storage of eggs would send winter eggs to a dollar a dozen, at this period of high food prices.

Where agitation against rotten eggs and cold storage eggs should begin is with the farmer and producer. These two must be made, if necessary, to quit sending fertile eggs to market. To quit this offensive practice without having laws to that effect would be the easiest—and the more profitable. Let us hope, this Board some day, by resolution, will recommend to the farmers and egg producers of this State that they will quit producing and sending to market fertile eggs, or eggs, that are eventually bound to be, rotten eggs.

The CHAIRMAN: You have heard the report. What action will you take upon it? We will take up the discussion of it later.

MR. HUTCHISON: Mr. Chairman, I move this report be received and printed in the journal of our proceedings.

The motion was seconded, put and agreed to.

MR. HUTCHISON: Mr. Chairman, the Trustees of the State College are endeavoring to get an appropriation for a poultry house or plant and a good suggestion in that paper might prompt this Board or its Legislative Committee to aid in securing that appropriation as well as could the State Poultry Association. Now is the time for you folks to aid the College in a substantial way. At the meeting last year there was an item placed in the bill for this poultry plant. We have Prof. Jackson up there, known to you all. He cannot accomplish the work for which he is employed without a good poultry house and good plant and, as suggested by the gentleman from Lehigh, I hope that you will all get interested in that plant and help the trustees secure that appropriation. Now, Brother Wittman, would you take this up with the Poultry Association and see what aid you can give in this work?

MR. WITTMAN: I would not repeat what was said at Philadelphia at the Annual Convention about the plant at State College. In fact, the chicken fellows said that if they were Jackson they would not stay there a day; they could not do anything; they were ashamed when they came there and saw what was there. There was no chance for the poor fellow to do anything. There was a strong resolution adopted to do all we could to help Jackson get an equipment at State College and I hope he will get it. New York State last year voted ninety thousand dollars for a poultry department in their State College. That means that New York State is going to have an up-to-date equipment in that line.

The CHAIRMAN: We will now take up the next report, the Report of the Committee on Livestock, J. L. Patterson, Chairman, McConnellsburg, Pa.

The SECRETARY: I had a letter from Mr. Patterson after I wrote him personally advising him of the meeting and asking him to be ready with his report, and he stated to me that he expected to be out of the State at the time of our meeting but left me under the impression, however, that he would prepare a report and send it to me. I have a letter from him this morning. He is out West and we have no report.

The CHAIRMAN: The next on the program is the Report of the Committee on Wool and Textile Fibres, D. S. Taylor, Chairman, Burgettstown, Pa.

The SECRETARY: Mr. Chairman, if you will go on to the next report I will see whether I have Mr. Taylor's report. I am not sure.

The CHAIRMAN: The next item on the program is the Report of the Committee on Fertilizers, A. T. Holman, Chairman, Millers-town, Pa.

MR. RODGERS: Mr. Chairman, Mr. Holman was my room-mate at the hotel and he was called away this morning before I was up and he had to go home. He laid his report out on the bureau and left word for me to present it and you could do whatever you saw fit with it.

MR. HUTCHISON: Mr. Chairman, I move that Brother Rodgers read the report.

The motion was seconded, put and agreed to.

Mr. Rodgers then read the report as follows:

REPORT OF COMMITTEE ON FERTILIZERS

By A. T. HOLMAN, *Chairman.*

The use of Commercial Fertilizers upon the farms of Pennsylvania is increasing at an enormous rate, more and more each year—eight million dollars worth being used last year in the State. The subject being so broad that it cannot be given justice in a short paper like this. One of the most deplorable facts is that farmers as a rule use fertilizers without knowing the contents thereof.

There are two lame points in the Fertilizer Law that are of much importance. First. The law should compel manufacturers to put but one row of figures on the bags. Second. Farmers and gardeners should be compelled to learn to read the analysis intelligently. It is estimated that not over two per cent. of farmers can read the analysis on the bags intelligently. This gives the manufacturers an opportunity to put two or three rows of glaring figures on the bags so as to confuse the buyer. I have met farmers, when you ask them "Whose make of fertilizer do you use?" will answer, Coon Brand, Wheat and Grass Producer, Harvest King, etc., and never know the name of the manufacturer.

HOME MIXING

Some people seem to think this is the only way to get just what the plants need. It is my opinion that it is a waste of time for the reason that no one can mix fertilizer by hand with the same accuracy that manufacturers can who are equipped with the proper machines to thoroughly mix the different ingredients. Any person who would want only a few tons of a special brand and call the attention of the manufacturers they will thoroughly mix just what you want and at a very slight additional cost. The only home mixing practical on the farm is to buy phosphoric acid or acidulated rock and use on the stable manure. In this way you get a more equally balanced fertilizer from stable manure. However, the value of stable manure depends upon the kind of animals that produced it, and the care taken of the liquid portion which contains more fertilizer than the solids, and it is a deplorable fact that this portion is often left to leak away from barnyards and but little of the fertilizer elements left for the soil. Yet you see good results where this yard manure is put, but it is largely due to the mulching effect of the manure.

A fertilizer has two values,—its commercial and agricultural value. Its commercial value is determined by the market value of its constituents and the cost of labor required in preparing it for the farmers' use. The agricultural value is the increase in quality and quantity it will produce in the crop to which it is applied. Germany claims to have increased their crop productions sevenfold by the use of fertilizers "commercial."

The use of fertilizers is traveling westward farther and farther each year over our once fertile prairies, which years ago it was claimed would never need any feeding in the shape of commercial fertilizers. In Pennsylvania the use of fertilizers has doubled or nearly so in the last ten years. The sections of the State that have the best soil appear to use more per acre than the sections that have less fertile soil. I have experimented along this line and I find there is a limit as to the amount that can be used to a profit.

FERTILIZER LAW

The Fertilizer Law appears to be doing a great good to the farmers inasmuch as the law compels their goods to come up to a certain standard. It is a noticeable fact that there are less stars in the report which were used to indicate that the goods fell below the standard of guarantee.

THE AGRICULTURAL DEPARTMENT

The Agricultural Department is doing good work in connection with its agents who have gathered eighteen hundred and nine fertilizer samples, of which six hundred and sixty-nine were analyzed. Preference was given to those which have not been recently analyzed. The samples analyzed group themselves as follows: 436 complete fertilizers; 8 dissolve bones furnishing phosphoric acid and nitrogen; 1123 rock and potash fertilizers; 47 acidulated rock and phosphates, furnishing phosphoric acid; 24 ground bones furnishing phosphoric acid and nitrogen and 31 miscellaneous samples which group themselves in substance not properly classified under the foregoing heads.

CONCLUSION

Farmers should post themselves in the judicious use of fertilizers and study the analysis. No study will pay better. The land is the farmer's bank, and when the land is enriched through the judicious use of fertilizers the bank account will be increased by which he makes himself a business man of greater use, and influence in the community wherein he resides, and will become an object lesson to his neighbors to the extent that we lead, others follow. He who makes two blades of grass grow where one grew before is a public benefactor.

The CHAIRMAN: You have heard the report. What action will you take upon it?

MR. JOEL HERR: Mr. Chairman, I move you that the report be received and printed in the Journal of our proceedings.

The motion was seconded, put and agreed to.

The SECRETARY: Mr. Chairman, I find that I have Mr. Taylor's report.

The CHAIRMAN: We will pass back to the Report of the Committee on Wool and Textile Fibres, by D. S. Taylor, Chairman, which will be read by the Secretary.

The SECRETARY: Mr. Chairman and Gentlemen: I have a letter from Mr. Taylor saying that he is not well at all and he had written a very brief report which he had forwarded. I have not read it. It is in a handwriting strange to me, written by a man not in good health and possibly I may have some trouble to read it.

The Secretary then read the report as follows:

REPORT OF COMMITTEE ON WOOL AND TEXTILE FIBERS

By D. S. TAYLOR, *Chairman.*

Textile fibers may be divided into animal (silk and wool) and vegetable (cotton, flax, hemp and jute and the like). Vegetable fibers may be further divided into soft fibers including manila, icil and istle. The ease and rapidity with which cotton fiber is transformed into yarn and its adaptability to all forms of woven fibers are responsible for the manner in which it has outstripped all other fibers and for its extensive and increasing use.

Wool, of all textile fibers, is one of the most interesting, as well as the most difficult for the manufacturer to handle. The wide range within which the production of wool is possible together with the desirable qualities it possesses for the manufacture of clothing, have made it a most important factor in the history of civilization. Sheep can be raised in any country where warm clothing is needed, (except in Polar regions), and it is natural that the woolen industry

should spring up in primitive communities and among people who are too poor to buy material for their clothing. Therefore, wool growing and manufacturing industry has a place practically in all countries. As a country increases in population, however, the lands must necessarily be utilized for agriculture and the range for sheep is reduced in recent years consequently.

The wool growing industry in Europe and America has not kept pace with that in newer countries. Nearly one-half of the world's present commercial supply of wool is produced in Australia, New Zealand and Argentina. Notwithstanding the fact that the production in the United States is not increasing materially, wool is produced in every state.

Silk. The world's production of animal silk has increased during the last century from 30,000,000 pounds to about 50,000,000 pounds. The leading countries in its production are China, Japan and Italy. The demand for silk has been so much in excess of the supply that ingenious efforts have been made in recent years to discover substitutes, and the manufacture of artificial silk has assumed considerable importance. The founders of this industry in France have sought not so much the formula necessary for the complete combination of chemical elements of animal silk, as to produce an article possessing the principle technical properties of silk—more practically—tenacity, brilliancy, elasticity and aptitude for coloring and bleaching. The approximate annual production of this artificial silk is about 8,000,000 pounds, and the production appears to be equal to the demand.

Flax was among the earliest plants cultivated for fiber, and until the advent of cotton, its fiber was used more extensively than that of any other plant. Prior to that time its cultivation was very general throughout the world. The production of this fiber in the United States is neglected. The area cultivated for flax seed is considerable. The average annual production of flax seed is about 100,000,000 bushels. Of this the United States produces approximately 25 per cent.

Hemp has been cultivated and extensively used for many centuries. In the United States the quantity produced is small, amounting to about 11,250,000 pounds. This represents a remarkable decline in the hemp growing industry in this country, as the production fifty years ago amounted to 149,000,000 pounds.

American production of cotton in 1908 was 6,501,210,800 pounds. Wool and hair from Alpaca goat and other like animals, 311,138,321 pounds. This does not include Mohair.

Sheep. We place the number of sheep fit for shearing in the United States at 41,999,500 head, a decrease of 293,705 from 1909. This decrease occurs in the estimated number of sheep in Western states, which, in 1909 was credited with 28,125,000, and now have 27,500,000, a falling off of 875,000, due largely to the excessive cold and storms of the winter of 1909-10, in the Rocky Mountain region. The sheep in the Southern group of states are estimated now at 1,915,000 head, a loss of 25,000 from the estimate of 1909. There has been an increase in the Eastern and Middle Western states; the number of sheep of shearing age in this group standing at 12,434,500, a gain of 606,295 from 1909.

The wool season of 1910 has unfortunately presented a marked contrast with the active and buoyant year preceding. It has been an unfavorable twelve month for wool growers. The year opened with probably 40,000,000 pounds, or forty per cent. more wool including that in bond, carried over than was the case at the beginning of 1909. The wool market in January, 1909, was quick, with prices fairly firm, but with a marked hesitation among purchasers to contract for new clips. Prices for wool in Pennsylvania for 1910 was about seven and eight cents lower than in 1909 and but little bought until late in the season. Wool values should increase, for several reasons: First, the wool-using population of the world has of late increased more rapidly than wool production. Second, wool's greatest competitor, cotton, has been in short supply and relatively dearer than wool, especially coarse wool. Third, employment at high wages has been so plentiful that the masses have been in position to buy clothes, and clothes made mostly of wool instead of mostly of cotton and shoddy.

Also, there are over 40,000,000 fewer sheep in the world today than there were fifteen years ago, and over 90,000,000 more people using wool. In the consumption of wool the United States is far and away in advance of either of the other great nations, for although somewhat behind the United Kingdom in the quantity required for her factories, all that is manufactured here is retained here for clothing and other uses of our people, and in addition, vast quantities of woolen fabrics are imported from abroad. A large percentage of the wool consumed in the factories of other countries is manufactured for export and sold for use beyond their borders, giving the United States preeminence as a wool consuming country.

The CHAIRMAN: You have heard the report. What action will you take upon it?

MR. GLOVER: Mr. Chairman, I move the report be received and printed in the journal of our proceedings.

The motion was seconded, put and agreed to.

MR. RODGERS: Mr. Chairman, I would like to announce that the Committee on Credentials will meet in the ante-room immediately.

The CHAIRMAN: We will next have the Report of the Committee on Dairy and Dairy Products, Dr. M. E. Conard, Chairman, Westgrove, Pa.

DR. CONARD: Mr. Chairman and Gentlemen of the Board: I am quite a little disappointed that I cannot come to you with a good, full report of the dairy statistics of today, but they are not available, so we have to enlarge on conditions as we have had them for a while. I hope sometime—it will not be long—until we can get the report from the last census which will give us some information which we cannot have at this time.

Dr. Conard then read his report as follows:

REPORT OF THE COMMITTEE ON DAIRY AND DAIRY PRODUCTS

By M. E. CONARD, *Chairman.*

The past ten years have been eventful ones in the dairy business. They have brought about conditions that are very discouraging, in the present state of enlightenment, to the average dairyman.

1. The steady and advancing prices of all kinds of dairy feeds.
2. The scarcity and high cost of labor.
3. The unprecedented demand for beef and veal.
4. Until very recently, the persistent low prices for butter, milk, and the like.

All of which have combined to narrow down the margin of profit to the producers until he has been obliged to live without many of the comforts he richly deserves.

There has been a lack of co-operation amongst the producers of milk and butter, and I venture to say that as a class there is a serious absence of business methods employed. There has been, and is yet, a tendency to look for the remedy only at the selling end of the business. We are too prone to think the fault all lies with the man who buys our product and that he should pay up and share the deficit with us. In fact we feel that of late the producer has not received quite his legitimate share of the cash paid by the consumer, but we must know that the dealers in dairy products are business men and are doing just what we should do to protect our own interest. They are doing business on business principles.

There is no reason why the consuming public should be expected to pay prices sufficient to compensate for our lack of proper comprehension of our responsibility as food producers.

The steady and unprecedented growth of the cities and towns of this great Commonwealth has put such markets within our reach as never existed before, and now it devolves upon us as dairymen to till the soil, select and breed up our herds and to so handle their output as to avail ourselves of these markets. There is an increased demand for raw milk which has resulted in a greatly decreased amount of butter made throughout the eastern part of the state.

It is gratifying to be able to report that there is a growing demand for a better and more thorough knowledge of how to utilize the countless acres at our command so that we may be able to supply this growing demand to our own advantage. The interest manifest at the fourteen dairy schools held during the present winter in almost as many counties proves the prevailing desire for more dairy knowledge that will enable us to cut down the cost of production. Indeed we are inclined to believe that we as dairymen are responsible for

some of the causes of the narrow margin of profit so much complained of for the following reasons:

1. The absence of co-operation and business methods on the part of the producer in selling the products, selecting and raising cows for the herd.

2. The purchasing of too much feed at high prices instead of adopting a more intensive system of farming and producing most of the food on the farm.

3. Because we are nearly all keeping a low percentage of cows that are worse than useless, that are eating up the profits earned by the better individuals of the herd. They can easily be detected by means of the scales and the Babcock test, and if removed from the herd the net profit of the herd will be increased.

We do strongly urge that methods be adopted by those in charge to as rapidly as possible put within reach of all dairymen the opportunity of getting the much needed information and training that will enable them to increase the productivity of their herds.

We are glad to say, in the absence of definite statistics, that we believe that the average per head output of the cows of Pennsylvania has been somewhat increased in recent years. Surely there is a decided increase in the interest manifested in individual butter and milk records, by the more enterprising dairymen and stock breeders. We cannot too strongly urge that the dairy be replenished by raising well selected calves from cows that have proven themselves profitable producers, sired by pure bred sires of families showing good and profitable records. Calves so selected are well worth the expenditure of all the cost of raising them well and the lottery of breeding is largely eliminated.

Summoning up conditions as we see them it appears that there is a decidedly increased demand for dairy products without a corresponding advance in prices paid, and if these conditions must continue as they probably will, it becomes necessary that we study more thoroughly the breeding and selection of our herds, their more economical feeding and stabling. The best and most sanitary methods of handling and marketing their products so that we reduce the cost to the minimum, for there is nothing more certain than that Pennsylvania's acres will, in a few years, be taxed to their utmost to feed the people.

In connection with this report I want to read you an extract from a book entitled, "Education and Efficiency," by E. Davenport, Dean of the College of Agriculture and Director of the Agricultural Experiment Station of the University of Illinois. The book is published by D. C. Heath & Son, Boston, Massachusetts. The extract is as follows:

"AN AGRICULTURE PRODUCTIVE.

"It is not enough that Agriculture should be profitable. In its development it must also become in the very near future enormously productive. How pressing this point will shortly become few people are able to realize, so abundantly have the virgin soils of this country produced in the past, so boundless have been their extent, and so small has our population been almost up to the present day. A little careful consideration, however, will speedily show that conditions in this respect are to undergo a fundamental change in the very near future indeed.

"Under good conditions, the human animal can double his numbers every twenty-five years. By the aid of emigration and despite the ravages of four wars, we have maintained this rate of increase in this country since the

Revolution and the population of the United States has doubled four times in the last hundred years. If we maintain this rate of increase for another century—and something is wrong if we do not—if we maintain this rate of increase we should have in this country a hundred years from now no less than twelve hundred million people, a hundred million of whom should live in Illinois. Under these conditions not less than thirty millions should live in the State of Maine—that is, the population of the entire United States at the time of the Civil War would then be crowded into a single one of our smaller states, and that within the present century.

"For various reasons this ratio of increase cannot much longer be maintained, yet it is the natural rate, and it tends to show us what would come about under normal conditions within a century—and what is a century in the life history of a people?

"Believe me, race suicide if it comes will be due not to a failure of the birth rate: it will be from our sheer neglect to maintain conditions that will insure food for the people. This is the form of race suicide against which we need most to protect ourselves, and it is none too soon to begin. The world has not yet learned how to feed such a population as is just ahead and before the present century is ended the largest single public issue will be that of bread.

"Within the life-time of children born today, scarcity of labor will be a matter of history, and abundance of cheap food will be a tale that is told by the grandfather in his chimney corner dozing in his dotage. We are educating in our schools today a generation of children to live a life that we ourselves have never seen and that history does not record, and we do well if we soberly calculate what their conditions of life are likely to be and mend our methods accordingly.

"We were three hundred years in getting a population of five millions of people, so slowly do numbers pile up when the base is small, whatever the ratio, but we have increased ninety millions in the last hundred years. With such a base and with modern conditions of life, this country can and will produce men at a rate the world has never seen. We can now produce in this country as much increased population in the next twenty-five years as we produced in the whole four hundred years since its discovery by white men, and we can produce twice as many more in the next twenty-five. In fifty years from now we shall have the population of China in this country, unless something goes wrong, and it is the business of agriculture to learn how to feed them. When it has learned this, it will have learned many a lesson the colleges do not now know how to teach."

The CHAIRMAN: You have heard the report. What action will you take upon it?

MR. KERRICK: Mr. Chairman, I move the report be received and printed in the Journal of our proceedings.

The motion was seconded, put and agreed to.

The CHAIRMAN: The reports are now open for discussion. You have heard all the reports. Has any one anything to add to them?

MR. J. ALDUS HERR: Mr. Chairman, speaking on these conditions mentioned in the last report, we have been trying to educate the producer of milk and dairy products. Don't you think it would be well also to try to educate the consumer or the party who consumes, in that he may know the real value of the one or real value of the different products. In our county of Lancaster more than one-half the milk produced—we are getting to be quite a dairy county—is sold at less than three and one-half cents a quart, wholesale. Now, while the tendency is to improve by means of breeding the right kind of cattle and adopting proper sanitary methods, the question today is why must this be with the man who produces the ideal article of milk when the consumer knows nothing or very little of the difference between a good, first-class article and the common article. We have plenty of people in Lancaster, probably one hundred milkmen, retailing milk, selling it from six to eight cents a quart, and I know that some of it is sold wholesale to the retailer at three cents a quart, and I know some that is sold at five cents a quart, whole-

sale, and yet the consumer does not know the difference. Isn't it time that we educate the consumer not only in the qualities of the milk but how to take care of it after they get it?

DR. CONARD: I agree that it is very one-sided, but the consumer is not here today. I am talking to the other people. There is a movement on foot to get that information. I have been asked a number of times to talk to ladies' civic clubs on milk, and I have done it and that leads me to believe that there are quite a number of people who are anxious to know the relative values and the necessary conditions under which milk can be produced so as to be getting a sanitary article and they should be posted and are asking to be posted as to what is their responsibility, what they should do in order to protect their milk supply. I tell them to go out to the farm, make inquiries of the producer, ask for the privilege of going through the barn any time they want to know these conditions, and it brings a closer knowledge to both parties of what the other party wants or can do. That is what we want to do. Brother Herr is entirely right because the other fellow isn't here.

MR. JOEL HERR: The gentlemen here are largely members of the Board of Agriculture and have control or management of farmers' institutes through the State. There are two points that struck me in this report as being important to be brought before this body, and I think they are subjects that ought to be discussed at greater length in our farmers' institutes. The one is the selection and breeding of dairy cows,—the important question of the selection and breeding of dairy cows. It is a matter of neglect. We are allowing our dairy calves to get away from the dairy. The dairyman tries to pick up the best cows he can, and then just as soon as the calves are ready for the butcher away they go. This indiscriminate slaughter of the heifer calves is a detriment to the dairy product, and as a result of that, milch cows are getting very scarce and they are getting very high priced. We can hardly have the quality of cows we want in the country today because of that indiscriminate slaughter of our calves.

The other thought I want to bring before this meeting is, the importance of a knowledge of the use of commercial fertilizers. Now in the little experience I have had in sampling fertilizers I found a very great ignorance on the part of the farmers and also on the part of the dealers in the value and use of commercial fertilizer and how to use it. I found the grossest ignorance in some localities. One fellow was selling twenty-five one hundredths of one per cent. of ammonia in his goods and he was selling it at twenty-five per cent. The gentleman really did not know any better until I called his attention to it. And so it happens that there are a great many people who really do not know how to use commercial fertilizer. My idea is that commercial fertilizer ought to be used to supplement our other manures. That is the valuable part of it. But the question is hardly ever discussed at the farmers' institute, and I only want to call the attention of the managers of these institutes to getting these subjects to a greater extent on their programs.

MR. GEARHART: I would like to supplement what Brother Herr said on the fertilizer question. It seems to me one thing that will protect the farmer on the fertilizer question is to teach him to know

what he is buying and that we eradicate the surplus printing on the fertilizer sack. For instance, they take a fertilizer that has two per cent. ammonia and two per cent. nitrogen, and then they will give the amount of ammonia in that nitrogen and then go on with a half dozen or more rows of figures, stating so much available and so much unavailable and so much O. K. and so on that the average farmer cannot intelligently know what he is getting. I think that all farmers' organizations should insist that fertilizer manufacturers only brand their sacks with the three figures that actually give the plant food in the fertilizers and then we will know something about it. I have handled fertilizers for years and used them and yet I am sometimes puzzled when I get a sack to know what is there, and I know I know more about it than some farmers.

MR. JOEL HERR: There is just one thought I want to add that I omitted, that is that the A. C. C. goods, the American Chemical Company's goods, are in great variety and some people are prejudiced against them. I am not speaking on that point. I have had people in my travels say, I only want this one goods. I have tried them and know what they are. Going back to another section they will say Lawrence & Clark is just the thing; we tried it and know it; and another will say another brand. While the dealers know the brand by the amounts in each sack, they simply give them by number, 18-2 goods; 10-2 goods, or 10-4 goods, or something of that sort. The fact of the matter is that the A. C. Company has large dispensaries which distribute the goods and the 10-2 goods come out of the same pile, no matter under what name or brand or some other brand, and the fellow who thinks he is getting some other goods he may get the same goods and from the same pile, under different names, with the same analysis. That is true of the average man who buys. He will possibly see the same goods he has under another name. I think these facts ought to be brought to light so that people may know what they are buying.

A Member: The State Inspectors ought to take care of that.

The SECRETARY: Mr. Chairman, the question raised by the gentleman is one that we have been thinking about for sometime and, in fact, a bill was presented sometime ago to the Legislature to settle that question exactly as it was presented by the gentleman, and I think perhaps if we had the power of this large Board extending all over the State behind us we might have no trouble in getting such an enactment, and I would recommend the passage of a resolution like this:

"Resolved, that we, the State Board of Agriculture, recommend to the General Assembly now in session the passage of an act providing that fertilizer manufacturers shall, in placing their guaranteed analysis upon the packages containing their goods, make no statement of equivalents or any other matter than the simple statement now required by law."

MR. C. G. ATWATER: Mr. Chairman, one of the gentlemen has just spoken in regard to obtaining more knowledge in speaking before the farmers' institutes regarding the components of fertilizers. Now there is one question about that that is valuable to farmers' institutes, a knowledge of the needs of the farmers. It seems to me

quite probable that some of the fertilizer people will be glad to send their representatives to talk to the farmers' and perhaps to the farmers' institutes on the subject of fertilizer manufacturing, where the constituents come from and what they are. I have had the pleasure of addressing this Board on the one ingredient, the sulphate of ammonia, and I would be willing to consider the suggestion to talk on that line if it be desirable.

MR. HUTCHISON: I move the resolution offered by the Secretary be referred to the Committee on Resolutions.

The motion was seconded, put and agreed to.

MR. HUTCHISON: I would just like to state that these gentlemen have gotten at the facts in the fertilizer law. When I go out to try a case it is based on what is available, what is there of value to you. When I take it into court I have had that experience that it is what the goods is composed of. It is not these other deceiving parts at all on the sack or package. It is not the revertable in this or in that, but based purely on what value is in the ingredients. That is just what I think the Secretary suggested should be—what amount of these goods is available and not have the farmer guessing when he puts something on the soil that he can draw on five or ten years. It is a splendid suggestion and if there is some effort made it can be accomplished.

The SECRETARY: Mr. Chairman, I would also suggest at this point that it would be very well if it could be incorporated in some resolution that we should require more knowledge as to what the fertilizer is composed of. It is a matter of fact that a very large number of large fertilizer users do not use the made-up material because they cannot be sure as to what that material is composed of. Now, if the user would know the source of the ammonia in that fertilizer, if he would know the source of phosphoric acid, etc., he would know where he is at; but if we don't know these things we hesitate to buy that material.

MR. DORSETT: I was told this week in a farmers' institute that a certain fertilizer company, whose name has been mentioned here this morning and is supposed to be under the control of the Standard Oil Company, is putting into its fertilizer an ingredient from their refineries which is of itself injurious to the soil. If that be true it seems to me the farmers ought to know it and this State Board ought to take some action.

The CHAIRMAN: Can anyone give us any more definite information on this subject?

A Member: What report does the State Inspector give along this line?

The SECRETARY: Mr. Chairman, in answer to that question let me state that there are no State Inspectors of fertilizers. There are agents of the Department of Agriculture employed to gather the samples from all over the State and they are sent to the Agricultural Experiment Station, at State College, Pa., and they are analyzed there. Dr. Frear, who is the chief chemist of the Experiment Sta-

tion. He makes a report before the Board tomorrow and then we can fire this question at him. If there is any truth in what Brother Dorsett says, what he was told at some institute last week, Dr. Frear will be pleased to tell us and if it is true it is something we want to go after and go after it hard. I think that we will put that up to Dr. Frear when he is here tomorrow.

MR. HUTCHISON: I would like to ask the Secretary what program he is holding in his hands.

The SECRETARY: This is just a little bit of the needful. Late in the afternoon yesterday, I think it was just a few minutes before adjournment, the stenographer called my attention to something lying there and I picked it up, as most men would when their attention is called to a thing of that kind, and there was one dollar and with it simply the name and address of a gentleman from York county, George W. Reinhart, R. D. No. 4, York county. Now, I want to know what this dollar is for.

A Member: It must be conscience money.

The SECRETARY: There has been a great deal of that kind of money coming to the State of Pennsylvania recently, but it was not a free-will offering. Is Mr. Reinhart here or can anybody tell me what it is for?

A Member: Mr. Secretary, I was over at the show, over on the other side of the square. I noticed that they were paying a fee of some kind. I believe it was the Horticultural Society receiving a fee of one dollar.

The SECRETARY: Then there is another source, a banquet to-night, and that is a dollar. There are two ways to place that. The Dairy Union are receiving a fee of one dollar. I think the fee is one dollar for annual membership in the Horticultural Society, and you know we have no fee here, and if this is to be a voluntary contribution to the Secretary of Agriculture I shall be very glad to know that. Is Mr. George Barnes here? Well now, this comes from your county, George, and if you can, please find out what Mr. Reinhart intended it for.

MR. BARNES: I did not know they had any money to give away.

The SECRETARY: I will inquire of the gentleman, Mr. Reinhart. I believe he meant that as his dues to this body for the year. There are no dues to be paid here and we want to give the money back to him. This is the State Board of Agriculture. This is a Board created by Act of Assembly, part of the government of the great Commonwealth of Pennsylvania, and, of course, we are not taking any fees from the citizens of the Commonwealth. These other organizations that are in session here are organizations under no Act of Assembly but they are nevertheless doing a very good work and we would be glad to see them getting as large a membership as possible.

MR. BARNES: I will see him this afternoon and mention the matter to him and rectify the mistake.

The CHAIRMAN: Are there any other remarks on any of the reports? Has the Committee on Credentials any report to make?

MR. RODGERS: The Committee on Credentials has a supplemental report to make. Mr. A. L. McKibben, of Beaver county, has been elected a member of the State Board of Agriculture; also, J. S. Patton, of Crawford county, and their credentials are in regular form and they are recommended for membership in the Board together with the others reported yesterday.

The SECRETARY: Mr. Chairman, I notice the next item of business on the program is the election of officers. The thought comes to me that perhaps it would be well to hear the talk of Mr. Martin, from New York, at this time and then close our forenoon session with the election of officers. I do not like to make that motion. If it is thought best, possibly someone will make the motion.

MR. GEARHART: Mr. Chairman, I make the motion that we hear Mr. Martin's talk at this time.

The motion was seconded, put and agreed to.

MR. JOEL HERR: We have not adopted the Report of the Committee on Credentials. The report has been made and we have taken no action.

The CHAIRMAN: We are now ready to act upon the Report of the Committee on Credentials.

MR. HUTCHISON: I move you that the Report of the Committee on Credentials be now adopted.

MR. JOEL HERR: That should include the election of the members; and that the members should be elected.

MR. GEARHART: I rise to a point of information. In some of the discussions here a brother here suggested that these men or seemed to infer that the representatives from the various counties, after being elected by the agricultural societies, shall come here and be elected. That would seem to infer that if this body was so minded they can be rejected as well as elected. I would like to know if that is according to law. It seems to me that if a member is duly elected as the law provides, that it is not necessary to be elected in this body. I rise for information.

The SECRETARY: The gentleman's trouble has perhaps arisen from the use of the wrong word. The organization at home, your county agricultural societies, elect and the returns are sent here, but this body and every other body is supposed to have some control over its own membership. The returns are received; they are passed upon by the Committee on Credentials who report that everything is in regular form and recommend their enrollment as members of the Board. That is right, is it not, Mr. Rodgers? That is your purpose? In your report does it say that everything is regular? I have not listened to that because my thoughts were on other things.

MR. RODGERS: Yes, sir.

The SECRETARY: It is the province of the Committee to examine the credentials and then report to the Board that the returns are regular and that they are properly elected and recommend that their names be placed upon the roll of membership. I would not like to belong to a body of any kind that did not have some kind of control over its own membership, because we do not care to sit in council of any kind with men in whom we do not have full confidence.

MR. RODGERS: What the Secretary of Agriculture just said is what the Committee on Credentials moved yesterday when they presented their first report.

The CHAIRMAN: The motion now is that the persons recommended by the Committee on Credentials be now enrolled as members of the Board.

The motion was seconded, put and agreed to.

The CHAIRMAN: It might be well to call the roll again in order to get the new members on record.

The SECRETARY: I am much obliged to the Chair for that suggestion. I intended to ask the privilege of calling the roll again; and allow me to state that if any of you know of any member of the Board that has been in attendance who is not here to answer this morning kindly speak out. We don't want to omit anybody. We want a record of all who attended this meeting.

The roll was again called and the members in attendance recorded present.

The CHAIRMAN: It has been suggested that we proceed now to the address on "Growing Potatoes," by T. E. Martin, of West Rush, N. Y. Is Mr. Martin present?

The SECRETARY: Mr. Martin was here a very short time ago, Mr. Chairman, but does not appear to be here at present.

MR. JOEL HERR: Let us proceed with the election of officers.

The CHAIRMAN: If there is no objection we will now proceed to the election of officers. The officers to be elected are, first, three vice-presidents. We are now ready to receive nominations.

MR. BARNES: Mr. Chairman, I place in nomination Mr. George G. Hutchison, of Huntingdon county, for the office of Vice President.

MR. HUTCHISON: Mr. Chairman, I nominate Mr. A. J. Kahler, of Lycoming county, for Vice President.

MR. JOEL HERR: Mr. Chairman, I nominate Mr. Peter Gearhart, of Clearfield county, for Vice President.

MR. RODGERS: Mr. Chairman, I move the nominations for Vice President be closed.

MR. BLYHOLDER: Mr. Chairman, I second the motion.

The motion was agreed to and the nominations for Vice President closed.

The CHAIRMAN: How shall they be elected?

MR. JOEL HERR: I move the Secretary cast the ballot.

MR. BLYHOLDER: Mr. Chairman, I second the motion.

The motion was agreed to.

The SECRETARY: Mr. Chairman, in accordance with the instructions of the Board, I cast the ballot for Vice Presidents for George G. Hutchison, A. J. Kahler and Peter Gearhart.

The CHAIRMAN: I therefore declare George G. Hutchison, A. J. Kahler and Peter Gearhart duly elected as Vice Presidents of the Board.

The next is the election of the Executive Committee. There are nine members to be elected. We are ready for nominations.

MR. SHOENER: Mr. Chairman, I nominate Dr. Conard, of Chester county.

MR. HUTCHISON: Mr. Chairman, I nominate Dr. Frank Beck of Blair county.

MR. GEARHART: Mr. Chairman, I nominate J. A. Herr of Clinton county.

MR. HUTCHISON: Mr. Chairman, I nominate Matthew Rodgers of Juniata county.

MR. PERHAM: Mr. Chairman, I nominate Mr. Kerrick of Bradford county.

MR. WARBURTON: Mr. Chairman, I nominate Mr. Naginey of Mifflin county.

DR. CONARD: Mr. Chairman, I nominate D. A. Knuppenburg of Wyoming county.

MR. KAHLER: Mr. Chairman, I nominate Mr. R. J. Weld of Warren county.

MR. BLYHOLDER: Mr. Chairman, I nominate Secretary Critchfield.

MR. JOEL HERR: Mr. Chairman, the Secretary is ex-officio a member.

MR. BLYHOLDER: Mr. Chairman, I nominate Mr. A. P. Young of Columbia county.

MR. HUTCHISON: Mr. Chairman, I move the nominations be closed, and that the Secretary cast the ballot.

The motion was seconded, put and agreed to.

The SECRETARY: Mr. Chairman, in accordance with the instructions of the Board I cast the ballot for members of the Executive Committee for Dr. Conard, Dr. Beck, Messrs. J. A. Herr, Rodgers, Kerrick, Naginey, Knuppenburg, Weld and A. P. Young.

The CHAIRMAN: I therefore declare Dr. Conard, Dr. Beck, Messrs. J. A. Herr, Matthew Rodgers, Kerrick, Naginey, Knuppenburg, Weld and A. P. Young duly elected as members of the Executive Committee.

The CHAIRMAN: Are there any other officers to be elected?

The SECRETARY: That is all the officers to be elected.

MR. JOEL HERR: If we are through with that, I move we proceed to fix the place of the Summer meeting.

MR. GLOVER: I second the motion.

The motion was put and agreed to.

MR. J. ALDUS HERR: Having the pleasure of representing our county, having been a representative for a number of years in your Board, and a year ago our round-up meeting having been at Butler, it seems to me to not be out of place to ask you gentlemen to come to Lancaster, the southeastern part of the State, last year being in the northwestern, and we heartily extend to you an invitation to be with us in Lancaster. We cannot show you the earth. We will try to treat you cordially and welcome you there.

MR. KERRICK: Mr. Chairman, at this time I had thought to extend an invitation to you gentlemen for Bradford. I know that you would be welcome. We have a great city of about six thousand inhabitants. The conditions are good for entertainment and I know that you would be well provided for and we would be very glad to have you come to our town. In talking with my friend here he said to me that he desired the Board to come down to Lancaster. I said to him that that would be consistent with me, but later in the future we would be glad to have this association come to Bradford and I finally consented to second the motion that we go to Lancaster; and now, gentlemen, I simply wish you to bear in mind this invitation and in some near future if you come to Bradford we will greatly appreciate the favor. I now second Mr. Herr's motion.

PROF. MENGES: I am not a member of this Board, but I have been meeting with the Board for a number of years and I would like to put in a good word for Lancaster, our next door neighbor. You know that it is the garden spot of the State and we have never met in Lancaster county, and if there is a county in the State that has been wakened up to the agriculture necessities of our State it is Lancaster county. You know we have always had a notion that the Dutch were pretty hard to wake up, and they are, we admit it; but when once woke up there is nothing to stop them; and I would like to help the movement along and second the motion of Mr. Herr that we go to Lancaster for the agriculture institute next Summer.

MR. BLYHOLDER: When the first two gentlemen spoke I was inclined to feel that I would like to go to Lancaster. But now they tell us they are so wide-awake down there and up-to-date that I feel inclined that we ought to go to some other place and wake them up. We ought to do all the good we can. There is no use wasting our energy where it is not necessary. Therefore I want to extend an invitation to you to meet at Kittanning, Armstrong county.

DR. CONARD: As next door neighbor to Lancaster on the other side, I want to second the motion. I am sure that Lancaster has very good accommodations. I am sure you will see a very beauti-

fully kept agriculture district and you will be within reach of the great power plant and anyone who wants to visit that great power plant on the Susquehanna can have the opportunity to do it by trolley and it is an opportunity to see a well kept agricultural district and I hope you will go to Lancaster.

The SECRETARY: You know there are two sides to every question and I want to call attention to the fact that possibly it might be well to go to Lancaster county to catch some of the enthusiasm that is there.

PROF. MENGES: That is just what I wanted to say.

The SECRETARY: Perhaps it would be best to go there and see what they have and see that beautiful country stretching out like the Garden of Eden in every direction from that beautiful city. There is nothing like getting the enthusiasm.

MR. KERRICK: That was simply the reason I asked the society to come to Bradford. We want the farmers to have the enthusiasm in Bradford.

J. ALDUS HERR: Please don't place your ideals too high.

A Member: Stand up; stand right up.

MR. J. ALDUS HERR: We will give you the best we got.

The SECRETARY: All we want to know is that you mean it.

MR. J. ALDUS HERR: We will stand right up and give you the best we have.

The CHAIRMAN: The Secretary will call the roll and the members will respond, naming the place of their choice.

MR. BLYHOLDER: I will withdraw Kittanning for the present.

MR. KERRICK: Understand my claim is not in for this year.

MR. JOEL HERR: Mr. Chairman, as there is only one place in nomination, I move that the Secretary cast the Board's ballot in favor of Lancaster.

The motion was seconded, put and agreed to.

The SECRETARY: Mr. Chairman, in accordance with the instructions of the Board, I cast the ballot in favor of Lancaster as the place of the Spring meeting of the Board.

The CHAIRMAN: I therefore declare Lancaster as the place for the Spring meeting of the Board.

Is there any other matter to be brought before the Board at this time?

MR. HUTCHISON: Mr. Chairman, I see we have a very distinguished member of our Board here, Governor Beaver. I know we will all be pleased to hear from him.

The CHAIRMAN: Governor Beaver has been called upon. Will you please come forward, Governor.

ADDRESS OF GENERAL BEAVER.

Mr. Chairman and Gentlemen: I am very glad to be with you again. I merely stopped in on my way from one of the other meetings. There is no particular subject for me to speak on that I know of, but I confess that I have been tremendously wakened up since coming to Harrisburg, particularly in view of the horticultural exhibition over at Johnston's Hall. Well, there is no discounting that exhibition, I tell you. I think it is somewhere about ten years ago that we were bewailing not only the business but the decadence of what little horticulture we had in Pennsylvania, and now you go into that great fruit store in Philadelphia where you can pay a half dollar a pound for hothouse grapes and ten cents a piece for Washington and Oregon apples and you will not see anything that will compare in color or quality or taste—because I had one last night—with what you find over here at the show, and if we give attention to the necessities and demands of Pomology in the way of soil and treatment, we are likely I think to stand at the very head of the apple producing regions of the United States. There is no reason why we could not be, for we produce just as good and better apples than you will find at the big fruit store in Philadelphia that were raised in California or Oregon.

I was talking with Mr. Tyson, one of our great growers, and I asked him whether he sold his apples at wholesale, and he said, no, he did better than that; that he got his price; that he had a market for every bit of his product by sending boxes directly to the consumer; and, of course, that is the thing for the producer to do when he can. But I am very well satisfied that there were Winesaps, Spies and old-fashioned Rambos which appealed to me as much as anything I have seen and if they went on exhibition at that great fruit store in Philadelphia alongside what they consider the choicest products of the apple countries of the United States, that they would stand up with all of them as to quality, appearance and taste and as to the mode of packing. After all, that is the great appeal to the eye. It occurred to me that the Italian's method of spitting on the apple and rubbing with his kerchief was apparent on some of the boxes, but on the whole I think they were pretty fair.

But there must be discrimination. This can be overdone by planting your apple trees in the right soil. The soil specialists tell you now they can put an augur in the ground and pull it out and tell you not only to plant apples but what kind. They say, there is the place for the Baldwin apple and you can see from the exhibition over there that there are soils that give color to the Baldwin, its natural color, its distinctive color; and that there are soils which fail to give that color. I saw apples there that were as distinct in color as it was possible to be and yet both labeled Baldwins. One of my friends gave me a Perry county Baldwin grown on a farm that probably cost him ten dollars an acre and I suppose he would not take one thousand dollars an acre for it now if he has it covered with Baldwin apples and the product is equal to the sample which he gave me last night. Indeed I heard of a gentleman this morning—I could hardly grasp

it—who had paid fourteen hundred dollars for an Adams county farm and had refused fifty thousand dollars for it the other day simply because it was covered with apple trees. It was in the apple belt. It was producing and ready to make him—well, at least, probably ten per cent. on what he had held his farm at and four hundred per cent.—more nearly one thousand per cent. on what he had invested. So it is worth while for Pennsylvania to persevere.

We are just on the verge of the revolution in our horticulture product, and particularly with that portion of horticulture which relates to Pomology, and I hope to see the time come when I will have to take back all I ever said about Pennsylvania not being equal to New York in regard to its fruit products. At the time it was said, of course, it was true but it is not true today and I am more and more convinced as we see the results of our experiments and the good work that has been done by the Department of Agriculture and co-operated with the State College in its extension work, I am more and more satisfied that we are on the very verge of a complete revolution and a successful revolution along this line. And it is true that horticulture in its other branches is just as important, and we have the soil that will make it just as successful. We have the best home markets in the world. Our census shows that it is, that we have in Pennsylvania the best home markets in the world. We have more cities of twenty-five thousand inhabitants and upwards than any State in the United States. New York has a number of cities that are larger than the majority of our cities, but we have more cities that are utterly dependent upon the region immediately surrounding them and they give to the regions surrounding these cities splendid home markets. And so we want to specialize not only along the line of Pomology but all along the lines of horticulture. We bring our lettuce—I am eating lettuce at home that probably comes from Florida or Georgia or the extreme South, probably from some islands that belong to the United States. We can raise that right here in Pennsylvania and right now. A little bit of glass will give to our farmers and, if they choose to do it as they always have been doing it heretofore—leave that work to the wives and daughters, it would give a splendid opportunity to the women to earn their pin money simply by the raising of lettuce under glass, and this is always not only a good marketable vegetable but an extremely wholesome one; so that it is a good thing for the community to meet the requirements of these cities, and much depends upon the immediate outside for the variety in their tables and in the wholesomeness of our food.

Heretofore it has been considered the thing for the farmer to raise the wheat that would produce the largest number of bushels to the acre and that has been considered the point to reach. If I can produce one hundred bushels of wheat to the acre it is better than thirty. That is not so. The millers come now and say no; what we want is the wheat that will produce the most nourishment and that will give the best flour to the consumer. After all the consumer is the ultimate man that we must look out for; and the millers say, We don' want your wheat; it don't produce the most and best flour. We must have the wheat that under modern conditions will give the best to the consumer, and so we discover that some of the wheats that would seem to be the best for the farmer are not the best for the consumer, and therefore we must try to meet the conditions that the

consumer imposes upon the market. This point was strikingly and vividly brought to the attention of the Research Department or Investigating Department of our School of Agriculture at State College when they listened very sympathetically to a proposition of the millers of Pennsylvania to establish a Department of Engineering, called Mill Engineering, at State College; that they would erect a mill and that we would carry on a line of experiments there that would tell the farmers of Pennsylvania what wheat would produce the best flour for the consumer and would give the most bread and best bread to the man that ate it. And you can see, of course, without any argument or without any appeal that that is sense. We must rise and advance in the production of all our articles which we combine under the general term of agriculture; we must cater to the consumer, and the better we come to him and the better products we offer to him the greater the demand for our products. Of course, you see in the Ladies' Home Journal and in these high priced advertising periodicals the Golden Flour. You see the products of Minneapolis and all other great flour-producing regions displayed in very extensive and very expensive advertisements. But after all there is no reason if we put the same amount of brains into our wheat products why we should not produce wheat in Pennsylvania that will make just as good flour, just as nourishing, just as beneficial and healthful articles of food as they do anywhere in the world, and so we must go a step further.

We have been going wrong in the production of our wheat. It is not the wheat that will produce the largest number of bushels to the acre, but it is the wheat that will give the largest amount of nourishment to the acre that we want to raise in Pennsylvania and the millers are beginning now to measure the price of wheat by the quality of the flour and, of course, that is the thing they have to do and it has come ultimately upon the farmer to do that thing, to take to the miller, to our own men who grind the wheat and furnish flour to our people, the wheat that will give the largest amount of nourishment to the man and woman and child who eats it. And we can see from just this little illustration that I have used the variety of our agriculture and the variety of demand which is being made upon the agriculture now for the highest products, for the largest amount of science that can be injected into it. Because this is largely a question of chemistry after all. When the flour is made, the chemist tells you what is in it, what the fundamental elements of it are and how those elements are to be used by the digestive organs of the human body to nourish the blood and send it to the heart and to the extremities on its way of helping man and making him the best animal that God has made. And after all that is just what we have to help to do and he is the man we have got to feed and we must feed him in a way that his body will be the very best for the services of his Commonwealth and his Country and of the best illustrative value to his neighbors for right living; and, of course, the farmers have a good deal to do with that. And so we are not only in co-operation with God in making man as perfect as he can be, but are in co-operation with the Commonwealth and country in making man as productive as he can be, and this, of course, is the ultimatum.

A Member How about the corn?

GENERAL BEAVER: We will increase that when you want to feed your steers and your horses.

The Member: I mean the Corn Exhibition.

GENERAL BEAVER: Well, of course, that is a marvelous exhibit. I went through it with a great deal of interest last night and, except our Brother Bayard's contribution which seemed to me to be a little nubby, the rest of it was very fine.

The SECRETARY: General Beaver has been giving us a little outline of what we have been doing in the past and the general progress that we are making and prophecies still greater progress in the future, and with it all we must reach the conclusion that we must have better roads, as we are going to have better and more products to get the products before those we have in our small cities in the Commonwealth. We must reach them and we have great distances to go, and I know you will all be delighted to hear that there is going to be a new departure that is going to start right here, one of the things that is destined to make more progress on the road question than anything heretofore. Tomorrow afternoon at four o'clock there will be a meeting of all the interests combined, all the people, here in the large hall upstairs. The Pennsylvania Railroad, I believe, proposes to furnish a train that is to be at the disposal of the State College for some two or three months. This train will be manned by the State College with people who are thoroughly competent to talk upon the question of making roads. The proposition is to take up the question just as they find it out in the country. They are going to tell the supervisors all over the country how to do the work and how to make the country roads and how in the end that shall work out the system of roads being constructed by the State. This is work in which we are all interested and I wanted to make the announcement at this time because we have a pretty full attendance.

The CHAIRMAN: We will now have an address on "Growing Potatoes," by T. E. Martin, of West Rush, N. Y.

Mr. Martin then delivered his address as follows:

GROWING POTATOES

By T. E. MARTIN, *Syracuse, N. Y.*

Mr. Chairman and Members of the Pennsylvania State Board of Agriculture: There is a difference between having something to say and having to say something. I believe, however, that I am in the last situation this forenoon. I am a farmer and I am going to talk to you from a farmer's standpoint.

I have just a few statistics here on potatoes. There are six states that produce one-half the potatoes of the United States. According to the statistics, there were 328,787,000 bushels of potatoes produced

in the United States in the past year, of which New York produced 44,676,000 bushels, an average of 102 bushels an acre; Michigan, 34,424,000 bushels, an average of 104 bushels to the acre; Pennsylvania, 27,896,000, an average of 88 bushels per acre; Maine has an average—I won't read the rest—of 210 bushels to the acre; Wisconsin has an average of 95 bushels to the acre; and Ohio has an average of 82 bushels to the acre. So these are the six states that produced one-half of all the potatoes in the United States, ranking in total production in the order named.

Our farm is located in Monroe County, New York, at a little place called West Rush, 13 miles south of Rochester. We bought this place in 1892. It was a fair farm. We knew that it must be drained. We did not have the means to drain it at that time. There was a \$3,000.00 mortgage on the place with 5 per cent. interest. In 1894 we took up drainage and we have expended \$2,500.00 and it has paid and paid several times over. I just want to say here that if you have excess water in the soil you cannot achieve the best results in potato growing. Our soil is a gravelly one principally. We have some light land. It is practically loam. We have a little dead sand and perhaps five acres of clay in seven or eight different places on the farm in little patches here and there the largest patch has possibly two acres. This is a brief description of our place. It has an elevation of about 550 feet above sea level.

Plowing is a very important point in bringing up soil. Good plowing is an art. I did not come here to instruct your farmers in plowing, but somehow there are many farmers that don't plow their land properly. We like to plow our furrows on edge, at an angle of about forty-five degrees, so that they stand up, for the reason that where the furrows are placed on edge we can get better mixing of the soil than by the furrows being upside down. Where the furrow is inverted or upside down there is very little mixing of the soil. And here are several points: One of the points is if there is organic matter plowed under and that furrow turn over flat, capillary attraction will be shut off between the sub-soil and the surface soil, and this is of the greatest importance especially if the season comes dry; and also by keeping these furrows on edge at an angle of forty-five degrees in the tillage of the field you can bring the different soil particles in contact with each other better than if the furrows were turned upside down. We have gradually lowered our plowing depth from six to ten inches. We plow ten inches for our work and we like that depth. Here is the surface of the soil. The manure and clover rotting down there will be more plant food in the first two or three inches of the surface soil than in the lower inches of soil. If these furrows are turned up on edge you can bring the different stratas and soil particles into contact with each other in the tillage. Sometimes I think about it in this way: I go to a meeting or come in contact with good people and thereby feel strengthened and improved. Then again I go to some other place and came in contact with immoral people with low ideals and I wish I had stayed at home. And so it is with the soil particles coming into contact, those of the surface with those lower down. There is an action set up by the heat, light and atmosphere and so on and that action is of importance to the unlocking of plant food.

We like Fall plowing. We have a short rotation of crops, 18 acres of each—wheat, clover and potatoes, a three year rotation. We grow late potatoes and we must necessarily get the potatoes planted early in Spring so that we can get them off in time in the Fall to sow the potato ground to wheat and then it is too late many times.

A Member: Did you have any experience with the disk plow?

MR. MARTIN: No, we don't use the disk plow. It is a good tool. We have a good many stone. I guess it would work. One of the tools we have is the double acting cutaway harrow. I am not advocating one tool over another but the tools that may be mentioned we like and they do the work well for us. This Clark double acting cutaway harrow has a double set of disks, a row of disks ahead and a row behind. The disks ahead throw the dirt out and the disks behind throw it back without ridging the surface much. We think it is a great tool for breaking and cutting up the soil. The preparation of the soil itself is something that should not be overlooked with the cutaway. We go straight with the furrows the first time over; the second and third times diagonally each way, and the fourth and last time with the disk harrow is straight across. That makes four disc harrowings the field received. It is a four horse machine, has 28 16-inch disks, and cuts seven feet wide.

A Member: Do you use that disk also for sowing wheat in the fall?

MR. MARTIN: Yes, sir; we use it after the potatoes are harvested in the Fall. Twice over and level with Spring tool harrow.

A Member: You don't plow again?

MR. MARTIN: No; we don't plow the potato ground in the Fall.

A Member: Do you ever disk before plowing?

MR. MARTIN: No; we do not, but I haven't anything against it at all. I think it would be a good thing. I will take that up a few moments later.

Just after the fourth disking we run a spring tooth harrow over to level up.

A Member: I don't know whether you use a jointer when you plow?

MR. MARTIN: Yes, sir; we always use the jointer on the No. 99 Oliver plow. We level up with the spring tooth; and then the fertilizer is applied. Sometimes there is one application of fertilizer between the third and fourth cutaway harrowings and worked in well and incorporated with the soil. It is a good plan to apply the fertilizer right after the first cutaway harrowing if you can.

Now, my position on the fertilizer question is this: I would not use an ounce of commercial fertilizer until I had first drained the land, given the soil the thorough preparation it ought to have, made clover grow luxuriantly and judiciously made, saved and applied the home manure supply, and then if I wanted more fertility and could make commercial fertilizers pay I would use it; but I would not use it, until that time.

One of the best means of getting and making fertility available on the farm is through the use of clover. We have practiced for four years past a sort of novel way of restoring our land to its original production. We mixed in 25 per cent. alfalfa with our clover seed, in this rotation which requires three years to go over the farm. Let this represent fields Nos. 1, 2 and 3. Suppose we start this on field No. 1 in 1910, sowing clover and alfalfa on the wheat ground in the Spring. We mix in the clover seed, one-fourth alfalfa. It requires three years to get once over each field, 1910 for field No. 1, 1911 for field No. 2 and 1912 for field No. 3; and then beginning the second cycle 1913, with these same fields Nos. 1, 2 and 3 we use fifty per cent. alfalfa. 1916-1918—3 years, 75 per cent. alfalfa—1919, all alfalfa. Suppose we have ten acres and we wish to apply one-half bushel per acre, we would mix in the five bushels of seed, two and one-half bushels of alfalfa and two and one-half bushels of medium red clover well mixed; then sow it together. We watch for certain conditions as we like to see the soil dry, and well checked up, taking the afternoon, because the soil is checked up more in the afternoon than in the morning. It is dryer and there are no wet leaves having the dew on them. We sow the seed with a broad-caster. Considerable seed goes into the checkings. These checkings ought not to be too deep. If too deep the seed gets into the ground too deep and will not germinate. The next morning we go on the field with a lever set, 3 section, spike tooth harrow, teeth straight up and down. We can harrow fifteen acres in half a day. We like to harrow the seed into the ground. I believe the clover and alfalfa seed should be covered up just as much as garden seed should, and we consider on our place that this is one of the vital points in getting a good stand of clover.

A Member: Do you sow timothy with the wheat in the Fall?

MR. MARTIN: Yes, sir; two quarts per acre at wheat seeding time.

A Member: Do you disturb the timothy?

MR. MARTIN: Yes; harrowing in the clover and alfalfa seed does dig it out some but if a clover or alfalfa plant takes its place I am delighted.

These alfalfa roots (holding up roots) show what alfalfa is doing on our farm. These roots have been carried around in my grip for several weeks and while they are broken off at about two and a half feet still they show what they have done. They are larger than the red clover roots and go deeper in the soil as this small one shows. It is four and one-half feet long now and has probably gone down into the sub-soil two feet further than its present length, judging by the size of the root where it is broken off. Now such roots will give us some hay. Understand the alfalfa seed is mixed in with the clover and sown in the Spring and harrowed in, and wheat harvested in July and in August the wheat stubble is clipped and next year the first crop of hay is cut. We try to get the hay in the barn by the 25th of June, though sometimes it is the 4th of July; but by the 25th of June we like to get it in because it is better food, more nutrition in it. By early cutting you will not get as large a crop, as much in weight; but the second crop will come on at once and there you will

gain. The second crop is cut about the 1st of August and the hay brought in and not left on the soil. The third crop is cut about the middle of September and left on the ground. We prefer to cut it because the next crop comes on and by cutting it you destroy the weeds and it gets back to the soil where it is in shape for plant food material quicker than otherwise.

A Member: How much seed do you use?

MR. MARTIN: We are sowing one-quarter bushel medium red clover and one-quarter bushel alfalfa seed per acre. Best seed obtainable. Clover is cheaper than fertilizers.

A Member: Will the clover sown with the alfalfa ripen with your alfalfa?

MR. MARTIN: The alfalfa comes a little earlier. We commence cutting it when the time is right for alfalfa, about the 15th of June in our section. Alfalfa makes more and better hay and soil is gradually inoculated.

A Member: Don't you find trouble in curing it then?

MR. MARTIN: Yes, there are seasons that it is more difficult to cure it. Sometimes we cannot cut it at that time owing to unfavorable weather.

A Member: Do you use any fertilizer?

MR. MARTIN: We are going to cut out the fertilizer. We have gradually increased to 1900 pounds of 4-8-12 per cent. home mixed fertilizer that costs \$32.00 per ton; but we are lowering it down now to 800 pounds per acre on potato ground. We expect the time is coming, and we feel sure the time will soon come when we can cut it out entirely, when we go from clover to alfalfa complete. That is it will require twelve years to complete this cycle, 1907-1918, from twenty-five per cent. alfalfa to one hundred per cent. alfalfa.

In traveling around New York State I come across various brands of fertilizer, and up in the northern part of the State I came across this advertisement. I will just read it: "Analysis, ammonia, 13 per cent.; potash, 36 per cent.; phosphoric acid, 33 per cent." I figured that out. The ammonia would be worth \$39.00; potash, \$32.40 and the phosphoric acid \$29.70 a ton, total for the ton, \$101.10, and that fertilizer was offered for \$10.00 a ton. Now, that is one illustration of the fertilizer situation. When a person practices home mixing he informs himself; he gradually becomes enlightened on the subject, and he hardly is aware of it at the time, but he gets enthusiastic in studying and figuring it out. I remember my wife used to say to me: "What in the world do you stay up nights for, figuring so on the desk here covering that paper with figures," and so on. And I told her I was figuring out fertilizer analysis and forgot myself. A person will get interested in the problems and soon arrives at a point where no fertilizer agent can fool him. It is not difficult to mix fertilizers. It costs about fifty cents a ton to mix, and a man can mix it as good as any fertilizer company can if you take the pains, the saving will range anywhere from \$2.00 to \$8.00 a ton and you get better goods and know what you have, avoiding paying freight on a lot of stuff from New York that is of no value to you. For instance, if you

wanted potash on your place it would be cheaper to buy it in the form of muriate or sulphate of potash rather than in the form of kainit and similar goods on which you would be paying freight on a lot of useless stuff and getting only a small per cent. of actual plant food. Here is another one that I came across in the State of New York: "Guaranteed analysis, 8 phosphoric acid, 4 potash, and sold for \$15.00 a ton. That fertilizer was worth to the farmer \$11.80. In that ton were 491 pounds of filler. We don't need a filler. We can put that in at home. What I would recommend for potatoes would be, say, 1500 pounds rock phosphate, 14 per cent., and 500 pounds muriate of potash; and this would make up an analysis of $10\frac{1}{2}$ phosphoric acid and $12\frac{1}{2}$ potash, and would cost somewhere about \$20.00. An application of 500 lbs. to 800 lbs. to the acre is a good one. As I said before, I would not invest in fertilizer until I had worked out the other problems first. By all means test out the fertilizer and use it intelligently.

A Member: You would not buy nitrogen?

MR. MARTIN: It depends. In buying these commercial goods for home mixing you have them separate. You have the nitrate of soda, the rock and the other forms of nitrogen, phosphoric acid and potash separate and I would test them down through the field. For instance, I would take the grain and fertilizer drill after the potatoes were planted and apply to a strip of three rows of potatoes to nitrate of soda and skip three rows; then apply 14 per cent. rock to three more rows and skip three rows; then try a strip to potash; and let the comparative results determine the profitableness of the respective fertilizers. On our farm potash pays well and that is the reason we are using potash so heavily. This came about no doubt by growing potatoes in short rotation. There is no way of knowing absolutely about the needs of our own land by trying it out this way. Nitrogen I would grow on the farm if I could. If it paid to purchase I would buy it. Clover is one of the plants that will bring up from lower depths the leached and lost potash and phosphoric acid and gather nitrogen from the atmosphere, which contains over \$1,000,000 over every acre of land.

A Member: Did you ever have any experience with vetch?

MR. MARTIN: No, sir; I think we are out of its proper home. We are too far north for crimson clover.

We grow just one variety of potatoes, Sir Walter Raleigh. I do not say they are the best variety. They do well in our section. In a comparison between the Green Mountain and the Sir Walter Raleigh on one farm the Green Mountain beat the Sir Walter Raleigh and on another farm the Sir Walter Raleigh beat the Green Mountain.

A Member: How about the Irish Cobbler?

MR. MARTIN: We don't grow that. We don't like a red potato for our trade.

A Member: But they are white.

MR. MARTIN: You see, that is what I know about the Irish Cobbler.

A Member: It is an early potato.

MR. MARTIN: I don't like the shape of a long potato. We like a round, white, late potato.

The SECRETARY: Mr. Chairman, I want to remind the gentlemen that we want to get everything that is said here, so that the fellow that don't speak out for the benefit of the whole audience is likely to get things mixed up.

MR. MARTIN: Now, we grow just that one variety, Sir Walter Raleigh. We plant a seed plat each year and select the very best potatoes and soil for it, usually containing two to three acres. The seed for the seed plot is treated with formaldehyde to destroy the scab germs. The number of bushels run from 50 to 75 of ideal shaped potatoes that are carefully selected. They are planted by themselves in the potato field. There are several advantages in that. You can give better attention and spray and fertilize better. About the middle of September, ten days before the potatoes die down, we go over the seed plat and dig up all the diseased and degenerated hills that have not made the growth they should. Understand this work is done ten days or two weeks before the potatoes die down so we can see what each hill has done. The hills not making the growth they ought we dig up and discard. The dead or dying hills we dig up and take out. We take a wheel harrow, crates and potato fork and one man takes two rows and when he comes to a tuberculosis hill we dig it up and take it out. By that method we take out of the seed plot all the diseased stock. At harvest time these seed potatoes are dug and put in the cellar. During the winter when we have time we go through the seed plat product, sometimes 900 bushels, and select out potatoes of the type we have our ideals set to. First, we want the size; next, the shape. We like a potato with a good seed end and a good stem end. Here is a very good type. It is too wide for the length. Here is one I like, from three-fourths to a pound each; and these are treated with the formaldehyde, keeping the scab down. We have an automatic potato planter. I would not recommend this machine. It is too complicated.

I think one of the things brought to my attention forcibly in potato culture was the result of this planter. Here and there in the field were four successive hills of dwarfish plants not up in height with the rest of the potatoes and I wondered what was the cause. I got my thinking cap on and one day it came to me that the seed that grew those four hills came from degenerated stock. We tested it by taking seed from the poor hills and found out next year that was the cause of the poor yield. The seed plant method that I have described is one way of getting better and blooded seed. Every farmer can get good seed himself. If you have a good variety of potatoes, Irish Cobbler, Green Mountain or Sir Walter Raleigh or any other variety that you have taken good care of I would go into the field and dig out 250 or 500 hills and go to another part of the field where the potatoes made a good growth and yield and dig out say 250, 500 or 1,000 more hills and dig, lay out each individual hill separately. Don't mix them up after you get the hills dug. Go over the hills as they are dug out and select the hills that made the best yield. With these next year start a seed and breeding plat. Our potatoes are planted

on a rolled surface to insure a uniform planting depth of three to four inches, three feet apart for the drills and in the drills a seed piece every eleven inches. I don't recommend that close planting. If planted close like that on thin soil in an unfavorable season probably the whole crop would result in small marble-like potatoes.

A Member: Do you say two and one-half feet between rows is too close?

MR. MARTIN: With late potatoes that is pretty close. You tramp down and mutilate many vines with cultivator and sprayer. I would rather plant the rows farther apart and the hills closer in the rows. Then the vines don't interlock with each other and you can get through with less damage from the machines.

In cutting the potato, such a potato as that (indicating it) would be cut in four pieces, again as large as that into eight pieces. We take a common paring knife and cut the seed like that (indicating). The way we plant there are 15840 hills to the acre. I think if we allowed one pound to the hill that would give a yield of 264 bushels to the acre, and if two pounds to the hill it gives 528 bushels; but planted three feet each way gives something like 4840 hills and a pound per hill you would have 80 2-3 bushels to the acre. You can regulate the size of the potatoes or run of the potatoes quite well. Of course, you don't know what the season is going to be. That makes a difference. But if the potatoes average too large, plant larger seed pieces to the hill or hills closer; but if potatoes do not grow large enough plant farther apart in the hills and less seed, less eyes.

After the potatoes are planted we run over the field with the double row riding cultivator. We like to go over the field three times before the potatoes are up, and, gentlemen, this cultivation, these first three cultivations, are done before the potatoes are up by following the potato row ridges left by the planter. We don't try to get close to the ridges but to break up the middles. The roller has gone over the ground and in planting this row the horse walks here (indicating). On the return the other horse walks in there again. We do want to cut deep at this time of the potato's growth because no potato roots will be torn off. I would not cultivate deep after the potatoes were up 4 to 6 inches high. If you follow out the roots you will find them extending out beyond the middles and more and when we break off the roots we are interfering with the potato root system. I would not go too deep the first time over, a little deeper the second time and still deeper the third time. Just as soon as the potatoes come up so we can see the potato rows we adjust the cultivator and run just as close to the row as we can. With the double row cultivator we take every other row or the odd rows the first time over and here we have the team in here and we get astride the first and third rows and the second time over we go astride the even rows, second, fourth and sixth rows, and so on through the whole field. This makes five cultivations, three before the potatoes are up and two after. Then we put the weeder on, and we like to go straight across the potato rows with the weeder the first time. The second time over we go lengthwise. This pulls the plants straight with the row and closer attention can be given after under work. This weeder work we like to do after nine o'clock in the morning, when the atmosphere warms up and it is dry and hot. The potato plant will stand

more abuse after it is warmed up than it will when cool in the early morning. It will break off easier when cool. The rest of the cultivation is done with riding cultivator by gradually widening apart the teeth nearest the rows. The cultivation ceases the latter part of July. Ordinarily the field receives about twelve cultivations. You say that is excessive. I know it is a lot of cultivation, but at the same time while cultivating we are preparing the land for the following wheat crop. The crop gets two hand weedings, about the middle of July and middle of August.

For spraying, we use the 5-5-50 formula.

A Member: By Bordeaux mixture you mean blue stone and lime?

MR. MARTIN: Yes, blue stone, or blue vitriol, and lime.

A Member: Did you have any experience with sal soda instead of lime?

MR. MARTIN: No. I never tried it. We have found by spraying that it increased the *net profit*, not net gain but net profit. In 1910 it was \$24.00 to the acre; 1909 the net profit, after deducting the cost of labor and cost of material, etc., was \$20.08; for 1908 it was \$48.80, and 1907, \$32.42; and still we did not have very much blight.

A Member: How do you prepare your mixture?

MR. MARTIN: I make up a solution, a stock solution of blue vitriol and of lime and am careful to know I have enough lime in the Bordeaux to neutralize the vitriol. Bordeaux is rather a disagreeable solution to handle.

In spraying, we use the E. S. Brown sprayer, but there are other good sprayers. We like to bring the nozzle straight into the row and to a 45 degree angle; straight over the row and at an angle of 45 degrees down on to the row. Each application is made in reverse directions, being careful to cover the whole leaf surface.

A Member: How many sprayings do you apply?

MR. MARTIN: I could not tell you how many. We try to apply 1,200 to 1,500 gallons a season to the acre, commencing with the forepart of July and closing the first or second week of September, and we try to get so much per week. Now in an acre of land there are 43,560 square feet, but when potatoes are in full foliage there is a leaf area that would perhaps cover two or three acres, so you see you must be thorough in this work. You must apply a lot of Bordeaux in order to cover all the leaf surface, because you have a lot of surface to cover and by going in different reverse directions and swinging the nozzles right and left you can spray this vast surface though you would not cover it all if you maintained the same nozzle angle and went the same direction the whole season.

A Member: How many gallons do you use at one application?

MR. MARTIN: We have a 110 gallon machine and I think it goes over about two acres.

Here comes in a point right here. By rolling the ground we secure a uniform planting depth and that is important, especially at harvest time in a wet season. After the potatoes are planted and grown you have a problem to get them all out. In digging the crop we use

four horses. We start on the lower side, digging every other row, working up hill rather than down hill. You have got to keep the four horses up hill and if you dug from up hill down the horses up here would walk on the dug potatoes. Four rows of dug potatoes make two rows of crates. We use for drawing a truck wagon, with wheels about two feet in diameter and six inch tires, which has a platform 6 x 16 feet, its capacity being 60 to 120 bushels. We have four horses on this wagon and one man goes on each side. I have seen the wagon many times start at the farther end of the field and come through without stopping, with 90 to 110 bushels on. That is one way of handling potatoes economically. In the Fall of 1906 we dug and picked up and drew into the barn, took to West Rush, one mile away, something around 1,000 bushels loaded on the car there, totaling 1,501 bushels dug and picked in one day, and the digger broke down and stopped the pickers fully an hour. Eighteen acres yielded 7,510 bushels, an average of 417 bushels per acre. I am just trying to show you what good methods have brought about for us. We do not need new knowledge as much as we do a better application of the present knowledge to bring results. When we started the average yield of potatoes was 60 bushels per acre. The past season we had an average of 328 bushels to the acre. Our best wheat crop following potatoes averaged 45 bushels per acre.

The SECRETARY: Mr. Chairman, I have been apt to sin many times and the mistakes of my life have been many. It comes to me more and more that I made a mistake in announcing the time for the road meeting upstairs. It is to be this afternoon, instead of to-morrow afternoon, at four thirty and short speeches are expected by the Governor of the Commonwealth, by General Beaver and by President Sparks and others. I hope there will be a large attendance at this meeting this afternoon at four thirty o'clock.

On motion duly made, seconded and agreed to, adjourned to 1.30 o'clock P. M.

Wednesday Afternoon, 1.30 P. M.

A. J. Kahler in the Chair.

The CHAIRMAN: Gentlemen, you will please come to order. The first topic this afternoon is the Report of the Apiarist, H. C. Klinger, Liverpool, Pa. Is Mr. Klinger present?

The SECRETARY. Mr. Klinger has sent his report to me and if it be the pleasure of the Board I can read the report.

The CHAIRMAN: What is the pleasure of the Board?

MR. HUTCHISON: I move the Secretary read the report to the Board.

The SECRETARY: Mr. Chairman, this report relates to the bee industry and we have a gentleman here, a Mr. William A. Selser, who is very much interested in this subject and will be able to interest

us, and if we pursue the usual course that has been pursued in the case of reports that have been sent in, this report could be received and ordered published in the Journal of our proceedings, and then we could hear this gentleman upon this subject.

MR. GLOVER: Mr. Chairman, I move the report be received and published in the journal of our proceedings.

The motion was seconded, put and agreed to.

The report of the Apiarist is as follows:

REPORT OF THE APIARIST

By H. C. KLINGER.

The year past has not been marked by any unusual features except that of the loss of colonies in wintering. The winter stores of honey in the greater part of the State were mainly honey dew. The cold of the winter being long continued, the bees were unable to take a cleansing flight, became sick with "dysentery" and died. In localities where there was no honey dew or where it was extracted in the fall and the colonies fed on sugar syrup or good honey, the winter loss was only a small per cent. Reports from all over the United States confirm the statement that bees should not be wintered on honey dew or even on a poor quality of honey. The foreign matter in this kind of honey being in excess causes a dysentery when the bees are confined too long without flight. Bees seldom "freeze to death" when sufficient stores of good honey are within reach, and the statement that "bees froze with plenty of honey" is only an evidence that they died from being confined too long on poor winter stores.

The various reports from different parts of the State indicate that the crop of honey was far below the average. This was caused to some extent by droughts and failure of the main honey plants. White clover, which is the source of the best grade of honey, was drought killed in the summer of 1909 and made but a weak stand the following spring. A few reports also were made that in several localities bees were killed by spraying with arsenical poisons. Bees died by the thousands and in one instance an entire apiary was wiped out. It seems that it takes some fruit growers a long time to learn that it is an injury, a double injury, to spray while the trees are in bloom. Certain delicate parts of the flower are injured by the spray when it comes in contact with them when it is open. Spraying at such time prevents perfect pollination and also kills the bees and other insects which Nature intended should assist in the forming of fruit. The best time to spray is before the buds open and from five to seven days after the blossom has dropped.

HONEY PLANTS

The plants upon which the honey producers of the State mostly depend are White Clover, Alsike Clover and Buckwheat. There are lumber regions of the State which yet produce crops of basswood honey, but the denudation of our forests will make that product a rarity in a very few years.

White clover carries first honors as a honey plant both in value as a source and an extra quality of honey. It yields a clear, finely flavored product and when nicely capped makes a gilt-edged article for the market. Alsike clover is coming more into prominence than formerly. Many farmers are discovering that it is profitable to sow it with the other red clovers. It is surer to "catch" than the red clover, has a tendency to "stick" to the soil longer and makes a better quality of hay than red clover alone. It produces fully as much honey as the white clover and its quality is not to be excelled. If it is grown for hay and for honey it will produce at least two good crops every season. The seeds being much smaller than those of the red clover a smaller quantity of seed is needed. A good mixture to sow for hay is one part of Alsike with three parts of red clover.

In some sections of the State buckwheat is the most important yielder of honey. The quality of buckwheat honey is perhaps not as good as that of the clovers or some of the other honeys. It is darker in color, has a heavier body and a flavor peculiar to itself. It is liked by some consumers and to others it is not so palatable. It usually does not command as high a price in the markets and yet there are some places where it brings as much as the finer grades of honey. Buckwheat does not require a large application of fertilizer nor even a rich soil to be a good producer of grain. It frequently yields forty to fifty bushels per acre and instances are on record of much larger yields. It is a quick crop and always leaves the soil in a mellow condition. Many of the hillsides, too poor for other crops, might be sown profitably to this grain merely as a grain crop. It seldom fails as a honey producer and not infrequently gives immense flows of honey. What farmer raising only a few acres of it would not keep a colony of bees "get and hold" all of his own?

There are numerous other plants which in some parts of the State are abundant enough to produce crops of honey, but in most localities serve only to tide over the supply from one flow to the other. Among these is alfalfa, another clover, which yields enormously in the West, where in many places it is the chief source of honey. This plant, too, will prove valuable to the beekeeper of the East after we have passed the experimental stage of growing it.

Another plant pressing itself into notice is Sweet Clover. This plant was for some time condemned as a weed, and working its way through years of prejudice, has attracted the attention of agriculturists and beekeepers as well. In growth it is similar to Alfalfa, and while it is young closely resembles it in appearance. It blossoms during a long season, producing a finely flavored grade of honey. It is valuable as a forage plant and as a soil enricher and inoculator it has no superior. A report from Lancaster county states that it was sown on a field infested with Canadian thistles in 1906, and allowed to reseed itself until in the summer of 1910 it was an almost impenetrable mass of leguminous matter five to seven feet

high. The Canadian thistles were crowded out. It will grow on waste places, the hardest clay, stony dirt banks and the most barren looking soil. Why not sow some of this seed on waste places, crowd out obnoxious weeds, enrich the soil and make the air hum with bees?

BEES AS POLLENATORS

In the economy of Nature the bee does not only serve as a collector of nectar but performs another most important work. In order that fruit may be formed, fertilization of blossoms must take place. This work is done either by insects or the wind. Some blossoms are staminate while others are pistillate. In order that fruit may be produced the pollen must be carried from the one to the other. Other plants have both pistils and stamens on the same flower. It may seem unnecessary that in this case any cross pollinization should take place. Nature has, however, provided that in order that species may not degenerate, in many cases, the pollen of any given flower does not fertilize the pistil of the same flower. This is due to the fact that pistil and stamen do not coincide in their time of ripening and thus depend on the pollen being brought from other blossoms. The bee is the best pollinator known, ever ready to perform his work for what he gathers by the way. He is the best answer to the fruit grower's problems as to what varieties or how he shall plant in order that perfect pollination may take place.

DISEASES OF BEES

The great importance of this subject will perhaps suffice as an apology or a partial repetition of a former report. Of the reports received during the year, three diseases are mentioned as prevalent: Dysentery, American Foul Brood and European Foul Brood. The first named was previously discussed. It is not infectious and can largely be prevented by the wide-awake beekeeper. The last two mentioned diseases are infectious and destroy colonies by attacking and killing the brood. These diseases are so widespread that they are the cause of alarm. Whole apiaries have been destroyed before the cause was known. It is impossible to keep it out of an apiary when others nearby have apiaries that are diseased. A single drop of honey robbed and carried from a diseased colony will infect a whole apiary. From recent reports to the Division of Apiculture, Washington, D. C., 18 counties in the State have reported cases of American Foul Brood and 29 counties European Foul Brood. Reports from all the counties were not available so that other counties not heard from may also have cases of the disease.

The progressive beekeeper will control and stamp out the disease, but it may be impossible to get all the beekeepers who have infected colonies to treat them promptly and hence it is desirable and necessary that the State pass laws that will provide for inspection of apiaries and give power to Inspectors to compel careless beekeepers to treat diseased colonies. It is the only remedy that is efficient in stamping out the diseases. In a large number of states laws have been passed and the results have been satisfactory.

With proper control of bee diseases and with the proper study and manipulation, this State has large possibilities and opportunities for the beekeeper. While but few localities will support possibly more than seventy-five to one hundred colonies, one can travel for miles without finding a single colony of bees. There are thousands of blossoms everywhere unvisited, and safe to say, tons of honey wasted.

It would be as unwise to advise every one to become beekeepers as it would to follow any other one occupation. There are those who specialize in apiary work and not only make a living but lay up a snug sum besides. To do this requires a certain adaptability, a knowledge of the business, and constant study. However, it is not necessary to specialize in order to succeed. Many farmers could keep a few bees and have their table supplied with honey every day in the year. The two interests are allied. Frequently the farmer is a fruit grower to a greater or less extent and the bees by their daily visits increase his yield of fruit. On the other hand, he could greatly increase his yield of honey by sowing his waste land to honey bearing plants. Any one within reach of a few acres of honey bearing plants by an investment of a few dollars in a colony of bees can not only make a handsome profit on his investment, but may find an increasing interest and sometimes to the extent that for the time being he will forget all his other troubles.

PROF. SURFACE: Mr. Chairman, I would like to say a few words by way of introduction of Mr. Selser; that he is one of the officers of the State Bee-Keepers' Association; that he has been one of the most successful beekeepers in the State and is very widely known in the bee industry. He has a message of importance to present here to-day.

I move you, Mr. Chairman, that Mr. Selser be asked to occupy the time that would have been taken by the reading of this report.

The motion was seconded, put and agreed to.

ADDRESS OF MR. SELSER

Mr. Chairman and Members of the State Board of Agriculture: It gives me great pleasure this afternoon in a few moments to tell you something that I could probably occupy two or three hours and might interest you all through. It seems to me hardly necessary for me to say anything that might interest the Board of Agriculture more deeply in connection with the work of bee culture because you show that interest by having a specialist of our number on your Board and his report that was spoken of. I hardly know where to begin on this vast subject, but I must confine myself to a few moments.

The **SECRETARY:** You are to take the time that would have been taken by this report.

MR. SELSER: If I were riding through this State and looking across the fields of the various counties and in the various agriculture pursuits and was to find as I rode some crop that was going to waste after it had been produced by Nature, and was to inquire into the

reasons and whys and wherefores of this crop where it would be going to waste, and I was to receive an answer that there were not enough workmen to gather the harvest, I think if I should report that back to the Board, you would rise up in horror or in consternation to find such a state of things existing in our own borders. Well, I am going to tell you something just as startling as that when I say that all over this State, county after county, I think I am safe in saying there are millions of dollars worth of harvest going to waste because there are no workmen to gather it; and when I speak of that I mean the marvelous workmen, the little honey bee; and in speaking of the harvest, is meant the money product of the plants and flowers throughout the State. There is no question about it, gentlemen, but what there are millions of dollars worth going to waste in this State because there are no bees to gather the harvest. I can prove this statement very readily if I want, but shall not talk on that line, simply make a statement of the facts that exist.

But what I want to get you interested in this afternoon more than anything else is to stop the waste of what we have already been gathering in the past years. Unless we do something and do it right away there is going to be a ceasing of the immense harvest we have gathered throughout the State of honey in the past years. In the twenty-five to thirty thousand beekeepers in this State, representing a harvest of honey up in many thousands of dollars—I am not familiar with the exact statistics—there has lately come a menace into the industry in the form of a disease among our bees, not so much among the bees but among the babies, the little bits of pupua of the bees or brood. This disease is called “foul brood,” and just to give a little instance of what it has done, let me say that ten years ago, in the lower end of Montgomery county, I kept four hundred and fifty colonies of bees. I noticed one year that I had a peculiar condition arise in the hive and after investigation I found it had a peculiar smell and I knew it must be some disease at that time, but did not know what it was. I immediately destroyed the hive and done it in such a way that I only spread the disease. I burned the hive, and the result of this was that the honey ran all around and the disease was thus spread all over the apiary by the honey that leaked out of the burned hive, and so for year after year I lost hive after hive, because I did not know the nature of the disease, until at the present time at that location four hundred and fifty colonies are reduced to one or two. When I say that, I am giving you the experience of many through this State. The trouble largely was that a beekeeper within a mile and a half of my farm kept bees in old box hives and he was as ignorant of the disease as I was, but after I learned something about it he could not manage his box hives because not accessible. I found the same condition existing in other counties in the State, and while I could eradicate the disease by scientific methods my neighbors were still spreading that disease in our bees. So you see how necessary it is for us to control the whole situation and the whole flying distance of bees.

I would just like to read you a little statement of the United States Department of Agriculture before I close, in regard to this great subject. This came in sort of a public statement from the United States Department of Agriculture about six weeks ago. It reads as follows:

"U. S. Department of Agriculture,
Division of Publications.
Jos. A. Arnold, Editor in Chief.

"WORK OF THE DEPARTMENT OF AGRICULTURE ON BEE DISEASES

"The honey bee annually produces a crop of honey valued at (at least) \$20,000,000, and there are vast opportunities for increasing this output. The most serious handicap to bee-keeping in the United States is the fact that there are contagious diseases which attack the brood of the honey bee. There are now recognized two such diseases, known as American foul brood and European foul brood. From data recently obtained by the United States Department of Agriculture, it is known that American foul brood exists in 282 counties in 37 States, and European foul brood in 160 counties in 24 States, and it is estimated conservatively that these diseases are causing a loss to the bee-keepers of the United States of at least \$1,000,000 annually. This estimate is based on the probable value of the colonies which die, and the approximate loss of crop due to the weakened condition of diseased colonies. The States in which the diseases are most prevalent are California, Colorado, Illinois, Indiana, Iowa, Kansas, Michigan, Missouri, Nebraska, New Jersey, New York, Ohio, Pennsylvania, Texas and Wisconsin; and it is unfortunate that these are the States in which honey production is most profitable, making the future outlook of the bee-keeping industry so much the worse unless active measures are taken to control the diseases. Furthermore, the distribution of these diseases is by no means fully known, and they are constantly spreading.

"Both of these diseases can be controlled with comparative ease by the progressive bee-keeper; but the chief difficulty encountered in combating these diseases is the fact that the majority of bee-keepers are unaware that any such diseases exist; they therefore often attribute their losses to other sources, and nothing is done to prevent the spread of the infection. It is, therefore, necessary in most cases to point out the existence and nature of the diseases, as well as to spread information concerning the best methods of treatment. Several States have passed laws providing for the inspection of apiaries for disease, and the bee-keepers in other States are asking for the same protection, so that careless or ignorant bee-keepers can be prevented from endangering their neighbor's bees. This inspection is a benefit in the spread of information concerning disease, in so far as the inspectors can cover the territory. The Department of Agriculture is helping in this work."

And so what we ask of you to-day is for you to endorse a bill that the Pennsylvania State Bee-Keepers Association drafted at their last annual convention, at which the whole ground was gone over very carefully. At our annual convention we took the various laws of the different states, of probably some ten states in the United States now that have just the law we are asking for, and cut out what we thought were some of the objectionable features and put in the best thoughts and are now ready to present what we think is a perfect bill to the Legislature. Our idea is to have it worked under your supervision so that there will be no new machinery set in motion and no extra expense on the State any further than absolutely necessary; so that largely under your own expenses you can supervise this work. The bill now is in such shape that it delegates this work to the State Entomologist and there are ten inspectors already inspecting the diseases of the orchards and other diseases known to the agriculturists and horticulturists, and carry out along that line the work. So that our bill is simply an act or a supplement or amendment to your act passed by the General Assembly and called General Assembly Act No. 60.

My suggestion is, in conclusion, to ask that your committee of this Board on legislation endorse this bill and do what they can to see to its passage.

MR. HUTCHISON: Mr. Chairman, I move the bill be referred to the Committee on Legislation for their consideration.

MR. GLOVER: Mr. Chairman, I second the motion.

The motion was put and agreed to.

MR. STOUT: Mr. Chairman, if permitted, I want to say a word in connection with this subject.

I am somewhat interested in this question as a bee-keeper and I have studied this subject from all phases. I get various bee journals and I see it is discussed and rediscussed from all parts of the United States, and while I am in sympathy with the movement, I have yet to be convinced that there is such a thing practical as getting inspectors to do this work that is proposed to be accomplished by this movement. Now, I know there are some laws on our statute books already that are practically dead letters. Some years ago our Legislature enacted a law authorizing our supervisors in the townships to go and destroy peach trees affected with "yellows." This is a disease that no one but an expert can detect at first, and I defy most any of the ordinary supervisors of the township to point out which of the trees are affected with peach yellows. They can't do it. And this law, while I would favor it if there was any possibility of carrying it into effect, would entail a great deal of expense. Now if you had one inspector in the State it would take him one hundred years to go over it to inspect the apiaries; if ten or fifty it would take them a long time to accomplish the same. And then it is a question, unless a man is a scientist and been a man who has had bees for a long period of time, whether the inspector would be able to discover this. I know very well in my own apiary I can go over my hives. I can open them and examine carefully and inspect my comb there; but with box hives how can he detect the foul brood in there. I am in sympathy with the movement, but yet at the same time I cannot see how the thing can be practically accomplished that is aimed at.

MR. SELSER: I would like to discuss this but I know we don't have the time, but I will say to the Committee on Legislation that we will get it done practically and on all these various points they will have no doubt about its workings with our explanation of it.

PROF. SURFACE: In addition to that may I say that in about twenty-five other states in the Union they have this inspection work of apiaries in successful progress. In Canada they have several inspectors. The disease there was so bad that it almost wiped out the industry entirely and it spread over in the direction of New York. In Wisconsin they have one inspector and he has the disease now down to one or two counties and gradually working it out. The inspection work is practical because done in other states, and where it is successful in other states we think it can be successfully done in ours.

MR. HUTCHISON: I would like to ask this gentleman a question. He stated that he kept four hundred and fifty hives or colonies of bees at one place. Can that be profitably done? Is there enough of material for them to work on in that section or have you plants, or what did you do?

MR. SELSER: I reply to that by saying that bees gather during the month of May and June, which are the harvest months, their crop to do them for the whole twelve months in the eastern section,

the section I am located. If, however, we take from them the crop that they gathered in May and June and sell it we have to, when we have such a long period between, feed back sugar syrup to them through the months of August and September to have them go through the winter. Where a man is running for business he can sell the honey for eighteen to twenty cents a pound and buy sugar at five and one-half cents a pound to feed back to the bees. It pays to do it.

The CHAIRMAN: Any other remarks in regard to this?

The SECRETARY: Before we take up another number I want to make a statement. That is, a number of persons throughout the State have written to me urging the passage by the General Assembly of an act prohibiting the scattering broadcast over the Commonwealth the seeds of foul weeds and asking that there be an act passed extending the provisions of the act that has been passed some years ago in reference to the Canada thistle to other weeds.

Now, I don't know any better thing for me to do in regard to this matter than place it before this Board and see what you think about it, and I have just now drawn this resolution:

"That the Committee on Legislation be instructed to present to the General Assembly now in session and urge the passage of a bill extending the law to prevent the spread of Canada thistle to the following foul weeds:"

And if in the judgment of the members of this Board this is a good bill to present to the Legislature, I would like to have you suggest what those weeds shall be. You know what is most troublesome in your sections of the State; you know what the provisions of the Canada thistle law are. The owner of the land is responsible for the care of the land on which the thistle grows and is required to see they are cut regularly so that they shall not be permitted to go to seed, and if there is danger of their going to seed anyone can make complaint to the constable of the township and he gives notice to the owner of the property, and if he fails to cut the thistles he can employ men to go upon the premises and cut them and collect the charges from the owner of the land.

Now, the question is whether this Board, in its judgment, thinks it would be proper to extend the provisions of this act to other foul weeds. I know in some sections of the State we are pretty nearly overrun and there is a general complaint in regard to this matter. I have a number of letters from different parts of the State in regard to it. I may say a bill has been prepared that I think provides for prohibiting the sale of grass seed, clover and alfalfa seeds in which there is to be found more than five per cent. of certain foul weed seeds.

MR. GEARHART: I am as much interested in the destruction of foul weeds, and especially of the Canada thistle, as any other member of this Board, and as the Secretary has said we have had for years on the statute books a very strenuous law for the destruction of the Canada thistle and I have never seen any one case—perhaps there may be sections of the State where it was employed—but I have never seen in our section of the State one single case where the law has been carried out and it seems to me that our statute books

are having incorporated entirely too many cumbersome laws that are ineffective, and unless some provisions are made for the enforcement of this proposed law I cannot see where there is much use in adding it to our statute books. Now, if some organization is formed or responsibility placed upon somebody who is not an individual, who is not a neighbor of mine. I don't like to prosecute the neighbors because that engenders bad feeling and we don't want to quarrel with our neighbors. They are farming all around me and I spend dollars every year to rid my farm of Canada thistle and other weeds, wild carrot and goldenrod and things of that kind; and yet there is a farm just west of me that has been for years polluted with wild carrot and other weeds and the seed gets on me by the bushel and I have to destroy them. But I don't want to prosecute my neighbor, and how are you going to enforce the law after you have got it?

MR. SHOENER: In our section in the cases where we farm our own farms we try to keep down the weeds, but there are a number of tenant farmers in our neighborhood and they don't try to keep down the weeds and one of the worst weeds we have is the wild carrot and daisy and I think they should be included. I think it is an important matter for my part. I don't know that the law is to blame if we don't enforce it; and if we don't, I think we ought to enforce and not allow it. The bill may be framed making it the duty of the constable to enforce it.

MR. DURNALL: I would like to ask, Mr. Chairman, whether or not the same bill includes some other noxious weeds. Isn't there anything other than the Canada thistle embraced in that law?

The SECRETARY: I think not.

MR. DURNALL: Then I have been under a wrong impression. I know that the trouble has been where they have been under the impression that that did exist under the law, providing for other noxious weeds than the Canada thistle because I thought it was. The neighbors would not keep them down and they would refuse the same as my friends urge here. It is a question of neighborly conduct toward their fellowmen; not to enforce it against the will. If you could not do it from moral suasion or very shame as to the condition of the farm, they would not do it at all; and we have acres upon acres in Delaware county that are going to waste under the burden of noxious weeds and we cannot get the law enforced.

MR. STOUT: In traveling over Lehigh county the past year I found a section that is very badly affected with Russian thistle, the only place I discovered it in Pennsylvania. That seems to be one of the most damnable weeds we have at the present time. I saw fields and the trolley tracks run over with it. I asked the man who owned the fields if he had taken time to try to destroy them. He said he had for a number of years been trying and the more labor he spent on that the more it increased. I just wanted to know whether this pest prevails in other places in Pennsylvania.

MR. DURNALL: Permit me to say that in the last few years we have been annoyed very much with this new thistle. We did not know until a year or two ago what it was. I am convinced that we have to look after it. The gentleman says he did not see how they

could do anything with it. Last year in a field of my own I did not know there was anything of that kind. I did not know we had it until we cut the corn and we found it was all over the ground. I did not know what to do; so we cut it and as soon as the leaves were dry I set fire to it before the seeds germinated.

Now, in regard to this Canada thistle, we have been compelled to have it enforced at our place and I don't know of one that was notified that if he did not destroy it and not allow it to go to seed that he would be dealt with according to law, and they cut it down. It is a good thing to be good to the neighbors, but when the neighbors are not good to you you must do the next best thing.

PROF. SURFACE: I want to call your attention to the fact that entire farms have been abandoned because of the horse nettle. This is an absolute fact and can be proven again and again. In the western part of our State we have today entire fields infested with the paint brush. It absolutely becomes so dense that it will not touch the ground and no stock will grow there. If legislation should be the proper means of suppressing this I think it would be worth all it costs to our farmers. I think the farmer could well be protected by the law the same as he is in the commercial fertilizers which are passed to the Secretary of Agriculture under the present law. The informant sends the data to the Secretary of Agriculture who sends an inspector there and see that these premises are inspected and then they must be treated according to law. The informant is not brought in and then it is not making enemies among the neighbors. If the law provided that the constable attended to this when made aware of the facts, possibly something of that kind might help.

A Member: Mr. Chairman, it may seem harsh, but I want to state at this point that I believe the growing of weeds is a natural condition and that the soil's condition is largely responsible for it, and that the plants that grow on that soil simply means Nature's effort to correct a condition that exists in that soil.

The SECRETARY: But, Mr. Chairman, you must remember that while the "good man slept the enemy came and sowed tares." There are some of these weeds that Nature did not provide for. I know, as a general proposition, what the gentleman states is correct. I know that there are certain weeds that are a great blessing to humanity, a blessing to the farmers, not only for the reason that it causes them to cultivate their gardens, which they otherwise would not do, but it provided vegetable matter to take care of the soil and hold it up. But the Canada thistle is something else. It is a weed the enemy came and sowed the seed while the good man slept. So we must not charge these bad things to Nature.

PROF. MENGES: I am not a member of the Board, but I believe that the Secretary of Agriculture, the Department of Agriculture and the State College are doing a work that will do more for the eradication of weeds than all your legislation and all your laws will ever do, and that is better farming. When you get down to better farming, teach your farmers to farm not for weeds but for crops. That is the thing to do. There is no trouble on farms that are cultivated right and I know this is a pretty hard thing and it may hit a lot of us and hit hard, too. I know farmers that grow their crops

don't grow weeds. They don't grow, and that man don't need any legislation. Now, then the thing to do is to try to get these fellows up to a higher realm.

About the Russian thistle, I met a young man last week in my institute work and he said the Russian thistle is a blessing to the northern part of Pennsylvania because the soil is deprived of all vegetation and the weed that has taken hold there furnished this in a manner and prevents it from starving. I do not know how you like that. We ought to go a little slow about this matter. This gentleman here, it seems to me, is on the right track. We should talk about these weeds being put here by Nature to help us to keep things in condition. I know the Canada thistle is cursed wherever it has been, except where they don't grow. Go into New York not far above the Pennsylvania State line and what do you find. You find the Canada thistle there and they don't care that (snap of fingers) for it. Why? Because it is within the latitude where it does not thrive very well. Go South and go beyond Virginia and you don't find it there. It seems that Pennsylvania is the place where it does thrive, and probably we ought to have some legislation in regard to that and then let us enforce it. I don't know whether it is the right thing to put laws on the statute books, especially such as will interfere with our relations among ourselves, our farmers, and get us into more trouble. I say that it don't look to me altogether right. I believe better farming is the answer to that question.

MR. WEIDNER: I think another thing that ought to be included in that list is barren grass. We have barren grass in Adams county and some of the people pay no attention to it and let it go to seed and bed in. I know farmers near Gettysburg that spent two to three hundred dollars to destroy this barren grass and yet it appears every year.

The SECRETARY: We might prolong this discussion indefinitely. If it be the sense of the Board that a resolution of this kind be referred to the Legislative Committee let every one consult with that committee.

The CHAIRMAN: What is the pleasure of the Board in regard to this resolution?

MR. HUTCHISON: Mr. Chairman, I move the resolution be referred to the Legislative Committee.

A Member: I second the motion.

The SECRETARY: Without naming any of the weeds that are to be suppressed?

The CHAIRMAN: I suggest that you place in there some weeds that have been discussed here and take chances; have them put in, the wild carrot and on down, and then let the committee consider them and have the members bring to the attention of the committee whatever weeds have been prevalent in their sections.

The SECRETARY: How about the wild mustard brought from the West?

MR. HUTCHISON: That is right; we have the wild mustard, the dodder; and I think horse nettle is one of our worst weeds.

The SECRETARY: In the letters I have received, the weeds named include Russian thistle, wild carrot, wild mustard, horse nettle and the wild onion or garlic, and as to that latter the greatest complaint seems to be from the southwestern part of the State.

A Member: Anything about the paint brush?

The SECRETARY: O, yes; the paint brush from the northwest.

A Member: I suggest the ox eye daisy.

MR. BARNES: Last summer I saw where one neighbor had mowed off the thistles along the side of the road, in from the middle, and the next neighbor let them all grow; and that is the misfortune of this: Where there is nobody to take care of it it is nobody's business and they spread.

The CHAIRMAN: We will have to pass this question. It has been referred to the Legislative Committee.

The next number on the program is the Report of the Mineralogist, Baird Halberstadt, who will proceed.

A Member: Mr. Chairman, I rise to a point of order. The gentleman's motion was neither seconded nor put and therefore the resolution has not yet been referred to the committee.

A Member: It was seconded by me.

The motion to refer the resolution to the Legislative Committee was then put and agreed to.

The CHAIRMAN: We will now have the Report of the Mineralogist, Baird Halberstadt, of Pottsville, Pa.

Mr. Halberstadt then read his report as follows:

REPORT OF MINERALOGIST

By BAIRD HALBERSTADT, *Pottsville, Pa.*

While twenty-nine (29) states of the Union are producing coal on a commercial scale and the production of all kinds of coal in the United States exceeds that of any other nation in the world, it should be particularly gratifying to the citizens of Pennsylvania to know that our own Commonwealth not only mines and ships more coal by far than any other state, but that it possesses a larger quantity of high grade coal than any other state. Other states may have greater areas underlain by Coal Measures, but not one can compare with Pennsylvania when the grade and value of its coal deposits are considered.

The State is made up of sixty-seven (67) counties, and of this number, forty-three (43) are either in whole or in part underlain by the Coal Measure rocks. Of the forty-three (43) counties so endowed, thirty-two (32) contain coal of the Bituminous and Semi-

Bituminous variety, the other eleven (11) produce, with the single exception of Lebanon, high grade Anthracite and Semi-Anthracite coals. Beaver and Butler counties, in addition to true bituminous coals, produce a good grade of Cannel coal. The latest statistics available show, that in 1909 the production of coal in Pennsylvania reached the enormous total of 216,429,528 net tons; that its tonnage exceeded that of any nation in the world save Great Britain. In the production of this enormous tonnage, there were employed 357,116 persons.

The ten (10) counties from which the production of Anthracite coal was mined were Carbon, Columbia, Dauphin, Lackawanna, Luzerne, Northumberland, Schuylkill, Sullivan, Susquehanna and Wayne.

The counties producing the Bituminous tonnage were Allegheny, Armstrong, Beaver, Bedford, Blair, Bradford, Butler, Cambria, Cameron, Centre, Clarion, Clearfield, Clinton, Elk, Fayette, Greene, Huntingdon, Indiana, Jefferson, Lawrence, Lycoming, McKean, Mercer, Somerset, Tioga, Washington and Westmoreland. Although Lebanon county in the Anthracite district and Crawford, Forest, Potter, Venango and Warren in the Bituminous district are in part underlaid by Coal Measures, no coal is mined from these on a commercial scale, although it is quite likely, that for local and home consumption, coal was mined in all of these counties.

In 1890, when in charge of the collection of the coal statistics of Pennsylvania for the Eleventh Census of the United States, I made an exhaustive examination into the annual coal tonnage mined from very small operations, for local and home consumption and which was never before accounted for. To the surprise of everyone, this was found to exceed one million tons.

The spot value of the coal product in Pennsylvania in 1908, when 200,448,281 short tons were marketed, was \$276,995,152. A comparatively recent computation by Mr. M. R. Campbell of the U. S. Geological Survey (1908) leads him to believe that the original tonnage in the Anthracite coal fields of Pennsylvania was 21,000,000,000 short tons and that of the Bituminous fields 112,574,000,000 short tons. Deducting the coal already mined and that left for support in the mines, Mr. Campbell estimates that at the close of 1908, there remained in the ground nearly 17,000,000,000 short tons of anthracite of which, approximately, one-half could be won.

In the bituminous region, he estimates, after the deduction of tonnages already mined and coal left in the mines for support, the tonnage remaining at the close of 1908 to be 109,000,000,000 net tons.

With an annual tonnage production of both anthracite and bituminous coal equal to that of the year 1908, Mr. Campbell estimates that the Anthracite coal fields of Pennsylvania will be practically exhausted in one hundred (100) years, and the Bituminous fields in six hundred (600) years.

As advances have been and are made toward better and less wasteful methods in many other directions, it is entirely within the bounds of probability to say that methods will be invented sooner or later whereby greater efficiency can be obtained from coal, than through the wasteful, yes, almost criminal, methods now practiced in its utilization. Many plans are now being perfected to check preventable losses. The gas producer is destined to play an important part

in checking waste, and it is not wild to predict, that even with present appliances, coal can be distilled and the gas derived from it piped, as is done with natural gas, and compete with this natural product.

How is the installation of plants at mines for producing electricity and conveying its energy to desired points, to be overlooked, when the matter is given serious consideration. Plans, too, to convert the heat units of coal into electrical units of work, without the intervention of the wasteful steam engine, are at present being considered.

Notwithstanding the vast deposits of coal within our State and the daily use of this almost indispensable fuel, it is surprising that even many of those who are mining and shipping it, as well as the mere users of it, should know so little about it and the products which can be derived from it. Generally, it might be said, that to the man or woman of average intelligence, coal is merely a black substance dug from the earth and is burned in stoves to furnish heat for cooking food, for personal comfort and to generate steam in boilers or perhaps some will say, in addition, that from it gas and coke can be made.

It would be hard to conceive of a more beautiful story than that of coal, from its origin; the successive stages of development through which vegetation passes in its progress from the growing plant to anthracite, but when we read that from this black, greasy, smutty mass can be derived medicines, fertilizers, perfumes and exquisite coloring matter, the story becomes almost romantic. Interesting and instructive as is the story of coal, the limited time at my disposal will not permit me, much as I would like to do, to give it in detail.

Briefly, the successive stages through which the vegetation passed in the formation of anthracite coals are:

Peat
 Lignite { Brown
 { Black
 Bituminous Coal
 Semi-Bituminous Coal
 Semi-Anthracite Coal
 Anthracite Coal

No considerable, if any, commercial deposits of Peat or Lignite are found in Pennsylvania, but no more valuable deposits of Anthracite and Bituminous coals are, perhaps, to be found anywhere, than in our own Commonwealth. The anthracites are used largely for household and industrial purposes. The semi-anthracites furnish an almost ideal domestic fuel, and as such, notwithstanding their extra cost, are in brisk demand throughout the year. Formerly, anthracite coal was extensively used in smelting iron, both in furnaces and cupolas, but of late years coke, because of its superiority has practically supplanted raw coal, in this direction. A new use for anthracite has been found in recent years for the production in connection with crude petroleum, of illuminating gas, and through the use of gas producers, it will sooner or later be extensively used for the production of gas for heating, metallurgical and other purposes. Bituminous coals vary much more in analyses than do the anthracites, for while the component parts are practically the same, their proportions differ widely.

In selecting a coal for specific uses, care must be exercised, because for certain purposes, a more expensive coal would not give as good results as a lower priced product. Certain coals are far better adapted to one purpose than another.

For smithing purposes, a semi-bituminous coal is far superior to a true bituminous coal, for by the use of the latter, because of its high volatile matter percentage, instead of a steady hot fire, the smith has a flaming one, from which much of the heat which should be concentrated escapes into the shop or passes out through the chimney. At several collieries in Clearfield county, mining the Lower Freeport coal bed, an ideal blacksmith's coal can be obtained. For the smithery and steam generation, the semi-bituminous coals are preferable to the bituminous or high volatile coals. Valuable as are the semi-bituminous coals for the smithery and for generating steam, for the manufacture of illuminating gas, they are not adapted and should not be used for this purpose.

In the matter of gas coals, Pennsylvania again shows her superiority, for the coal of the Pittsburgh bed in parts of Westmoreland and Allegheny counties has no superior, if an equal, in the United States for the manufacture of illuminating gas. The coal produced from the Pittsburgh bed in the Connellsville region makes the standard coke of the United States and, as a coal approaches or recedes from the analysis of this coal, its value as a coking coal is seemingly determined, at least by the trade.

It is interesting to study the changes shown in the analyses of coal from the Pittsburgh coal bed, as they show much difference in the percentages of constituents and especially so in the amount of volatile matter and sulphur contained. Connellsville coal (Pittsburgh bed) valuable as it is as a coking coal can not compete with the Youghiogheny-Westmoreland coal for gas purposes, nor could the latter compete with the former for the manufacture of coke. A good grade of gas coal has been mined at Reynoldsville in Jefferson county, and a good coke is made in the vicinity of Punxsutawney, in the same county.

Cokes are manufactured from the coals of the Upper Freeport and Upper Kittanning beds along the main line of the Pennsylvania railroad, between Cresson and Johnstown, as well as a small amount in Huntingdon and Bedford counties. The main source of supply of coke in Pennsylvania is drawn from the Connellsville region, in fact, it may be said that none of this coal is shipped in a raw state but the entire output is manufactured into coke. The Youghiogheny-Westmoreland coal output is largely devoted to the manufacture of gas. This is as it should be, because these coals possess to a very high degree the essential properties requisite for the manufacture of coke and gas.

Coals from certain districts in Pennsylvania have long enjoyed and retain enviable reputations for excellence for specific uses. In fact, so strongly have they become entrenched, that they are now accepted as standards, and when coals from other districts are brought into the markets, these coals are used for comparison. In these days of brisk competition, no district can long maintain its lead, unless its coals possess the essentials requisite.

The question arises: What are the essential characteristics to be sought when purchasing coal for specific purposes.

The specific purposes, it is assumed are:

- (1) Steam generation.
- (2) Gas manufacture.
- (3) Coke manufacture.
- (4) Smithing purposes.
- (5) Domestic uses.

Steam Coal

For the generation of steam, a coal should possess

- (1) A high evaporative power.
- (2) It should kindle readily.
- (3) It should burn steadily and generate a large body of steam quickly.
- (4) It should not clinker, even when subjected to a high heat.
- (5) It should be low in ash.
- (6) Its percentage of sulphur should not exceed in any case, one per cent., as this is detrimental to both grates and flues.
- (7) The contained volatile matter should not exceed the amount requisite for rapid combustion.
- (8) It should bear transportation well, so that it will not be seriously reduced to fine coal.

A study of the chemical analyses of Standard steam coal seems to indicate that the best results have been obtained wherein the percentages ranged as follows:

Fixed carbon, ...	67 to 74 per cent.
Volatile combustible matter, ...	17 to 22 per cent.
Sulphur, ...	0.5 to 0.9 per cent.
Ash, ...	5.0 to 8.0 per cent.

Gas Coal

The requisites of a good coal for the manufacture of illuminating gas are:

- (1) That the percentage of volatile matter should exceed 33 per cent.
- (2) That the percentage of sulphur should be low and never exceed 0.8 per cent.
- (3) A low percentage of ash, not more than 6 per cent.
- (4) That it should yield from 75 to 85 candle feet per pound carbonized.
- (5) That it should leave, after the extraction of the volatile matter, a bright merchantable coke.
- (6) It should be able to bear transportation to great distances, without being reduced to slack.

An average of six (6) analyses of coals from the Youghiogheny-Westmoreland gas coal district shows:

Moisture, ...	1.475
Volatile matter, ...	37.404
Fixed carbon, ...	56.024
Sulphur, ...	0.687
Ash, ...	4.410
Total, ...	100.000

Coking Coal

The essentials of a good coking coal are:

- (1) It should be pure bituminous coal.
- (2) That it should contain a sufficient amount of volatile combustible matter (25 to 30 per cent.) to complete the coking process, with the expenditure of but little, if any, of its fixed carbon.
- (3) It should not contain over 0.7 per cent. sulphur.
- (4) That its phosphorus content should not exceed 0.12 per cent.
- (5) "That the coke produced from the coal should possess sufficient tenacity to sustain, without crumbling, the burden and blast of the furnace, and the cellular structure should be sufficiently open to facilitate its impregnation and solution by the carbonic acid gas in the furnace."

A typical specimen of Connellsville coking coal, upon analysis, showed:

Moisture, ...	1.260
Volatile matter, ...	30.107
Fixed carbon, ...	59.616
Sulphur, ...	.784
Ash, ...	8.233
Total, ...	100.000

A very good grade of coke is made from the coals of the Pottsville series, in both the New River and Pocahontas regions of West Virginia. Analyses of these coals exhibit a higher percentage of fixed carbon and lower percentages of moisture, volatile combustible matter, sulphur and ash than the Connellsville coal. The deficiency in volatile matter in these is detrimental, for the loss of carbon in coking exceeds that of Connellsville by 12 per cent.

Smithing Coal

The requirements for a good smithing coal are that:

- (1) It should possess a high heating power and to obtain this, the percentage of fixed carbon should exceed 70 per cent.

- (2) It should contain at least 18 per cent. and not more than 22 per cent. volatile matter which is quite sufficient to make it kindle readily and to supply the heat required for coking; it should also possess sufficient coking qualities to form an arch or vault over the forge.
- (3) It should not exceed 0.7 per cent. sulphur, since an excess of sulphur prevents good welding.
- (4) The percentage of ash should not exceed 6 per cent.
- (5) The coke should be bright, clean silvery and have a metallic ring when struck.

With a coal possessing these properties, there is but little waste and, with such, a smith can concentrate the heat upon the iron to be wrought and not have a great blazing fire, with most of the heat escaping through the flue or chimney. When the sulphur exceeds one per cent. a scum or greasy substance forms on the surface of the iron, making a strong weld impossible, and it is otherwise detrimental.

A coal that, among others, was recently tested for blacksmith's use and which gave by far the greatest satisfaction showed upon analysis:

Moisture, ...	0.780
Volatile matter, ...	21.680
Fixed carbon, ...	73.052
Sulphur, ...	0.688
Ash, ...	3.800
Total, ...	100.000

Coal for Domestic Use

For domestic purposes, a coal is desired that burns steadily and will remain ignited at a low temperature until consumed. Such conditions can not be obtained from a true bituminous coal, because it burns too freely and is difficult to control. Again, the high volatile coals, if burned in open grates or stoves, not only throws out soot and dirt but clog the chimneys. Such coals, if high in sulphur, are extremely objectionable, not only on account of the odor thrown off, but because of their tendency to corrode grates and pipes. A coal forming clinkers at a low temperature is undesirable, since such will check the draft by clinging to the grate bars. A coking coal is also undesirable. A dry non-coking coal, high in carbon, with sufficient volatile matter to kindle it quickly; one with but little or no sulphur and a low percentage of ash, affords the most desirable coal for domestic use.

It has been said that the story of the formation of coal is both instructive and interesting and, if that be so, the story of and the methods of obtaining the valuable products to be derived from bituminous coal, through destructive distillation, are equally, if not more so and it reads more like a romance than a cold recital of facts. By destructive distillation is meant the process of heating an organic

compound in a closed vessel without access of air and the collection of its products. If bituminous coal be placed in a closed retort and heated, there results from such heating four principal products: gas, water liquid, coal-tar and coke. The gas thus formed is not yet fit for illuminating purposes, but must be purified. In the course of this purification, the gases are passed into a tank nearly filled with water and from them, the ammonia, produced by the combination of hydrogen and nitrogen evolved, is rapidly absorbed. This then is the gas or ammoniacal liquor which is the principal source from which ammonia is derived. If the gas liquor be heated with lime and passed through diluted sulphuric acid, we obtain crystals of Sulphate of Ammonia, so valuable as a fertilizer.

There are many other products of industrial value associated with ammonia. Much of the gas liquor of gas works is sold to chemical works, yet much is still permitted to waste.

Coal Tar

This product of the destructive distillation of coal was once too, like the gas liquor permitted to go to waste, as there was little or no demand for it. Its value, however, has long since been known. From this ill-smelling, to many, a disgusting and unattractive mass, there are today prepared more than six hundred products. Among these are the almost endless varieties of aniline dyes, paraffin, naphtha, benzol, anthracene, pitch, naphthaline, carbolic acid, creasote, picric acid, and many additional surgical and medicinal preparations.

WASTES

When we view the black dense smoke belching forth from chimneys, the stacks of mills, factories and locomotives, we are reminded that the waste must be, in the aggregate, enormous. In London, where estimates have been carefully made, the loss of coal in smoke when burned in open grates is between one (1) and three (3) per cent. and that of the volatile matter is about ten (10) per cent. Careful firing in factories and mills and on locomotives reduce this waste, but while we have cheap coal and the Legislature permits the careless firemen to load the atmosphere with particles of unburnt carbon, we cannot expect to have these wasteful methods abolished. The beehive type of coke oven, so generally used in Pennsylvania, is one of the most wasteful contrivances ever invented, and from these thousands of ovens there have passed off into the air smoke and vapor which had they been saved, the value of the products would run into millions of dollars. Some day this waste may cease, but not, perhaps, for many years to come.

The appended table was prepared a number of years ago for private use. It has been found to be of great value and will prove so, no doubt, to such of our farmers who live and own coal lands in Western Pennsylvania.

CORRELATION TABLE
THE COAL MEASURES OF WESTERN PENNSYLVANIA.
 Compiled by BAIRD HALBERSTADT, Engineer, Geologist and Prospector, Pottsville, Pa.

Prof. J. D. Dana's Table of Formations.	Table of the Second Geological Survey of Pennsylvania.	Names Provisionally Adopted by Prof. Lesley.	Numbers.	Coal Beds in Each Series and Their Thickness.
Upper Coal Measures, ...	Upper Barren Measures, 1,100-1,240 ft. Upper Productive Coal Measures, 350-450 ft.	Greene County Group, 300-400 ft. Washington County Group, 700-900 ft. Monongahela River Series, 350-450 ft. Barren Measures, 600-650 ft.	XVII XVI XV XIV	Windy Gap (1' 0"-2' 0"), Nineveh (1' 0"), Dunkard (1' 0"-1' 6"), Jollytown (2' 0"-3' 0"), Washington A (4' 0"-5' 0"), Washington (3' 0"-8' 0"), Little Washington (0' 6"-0' 10"), Waynesburg B (1' 0"-2' 0"), Waynesburg A (3' 0"-4' 0"), Waynesburg (4' 0"-10' 0"), Uniontown (3' 0"), Sewickley (3' 0"-6' 0"), Redstone (3' 0"-3' 0"), Pittsburg (4' 8"-19' 0"), Little Pittsburg (1' 0"-2' 0"), Elk Lick or Barton (2' 0"-4' 0"), Platt or Crinoidal (1' 0"-1' 8"), Bakertown or Price (3' 0"-4' 0"), Masontown or Brush Creek (0' 6"-4' 0"), Mahoning (1' 0"-3' 0").
Lower Coal Measures, ...	Lower Barren Measures, 550-650 ft. Lower Productive Coal Measures, 250-300 ft.	Allegheny River Series, 250-300 ft.	XIII	Upper Freeport (E) (1' 0"-8' 0"), Lower Freeport (D) (4' 0"-7' 0"), Upper Kittanning (C) (0' 6"-3' 0"), Middle Kittanning (C) (2' 0"-4' 0"), Lower Kittanning (B) (3' 0"-4' 0"), Clarion (A) (3' 0"-5' 0"), Brookville (A) (4' 0"-5' 0").
Millstone Grit, -----	Pottsville Conglomerate, 200-300 ft.	Pottsville Conglomerate series, 200-300 ft.	XII	Mercer. Upper (0' 4"-2' 0"), Mercer, Lower (0' 8"-3' 1"), Quakertown (1' 0"-2' 0"), Sharon (1' 0"-4' 0").

The CHAIRMAN: You have heard the report. What action will you take upon it?

MR. GLOVER: I move the report be received and published in the journal of our proceedings.

The motion was seconded, put and agreed to.

The CHAIRMAN: The next on the program is the Report of the Meteorologist, Mr. E. R. Demain, Harrisburg, Pa. Is Mr. Demain present? He does not seem to respond, so we will pass to the next topic. The next on the program is the Report of the Ornithologist, Prof. H. A. Surface, Harrisburg, Pa.

Prof. Surface then read his report as follows:

REPORT OF THE ORNITHOLOGIST

By PROF. H. A. SURFACE, *Harrisburg, Pa.*

Mr. Chairman and Members of the Board: It is my pleasure and duty to submit the following as report of your Ornithologist for the year 1910. With but one exception, the year has not been characterized by any remarkable feature of Ornithology in Pennsylvania, besides the growth of that steady, strong and healthy sentiment for bird protection, for both practical and ethical reasons, which has been so valuable in giving Pennsylvania its deserved reputation for results in this cause. Only yesterday one of America's great agricultural speakers and writers, Mr. George T. Powell, in charge of the Extension of Agricultural Experimental Work, with office in New York City, remarked in this building that "it is recognized that Pennsylvania leads the Union in its strong sentiment and good results for bird protection." We must acknowledge that it is our opinion that this is due to the combination of three essential factors: First, public sentiment; second, judicious legislation; and third, the co-operation of all officials as well as private citizens for the proper enforcement of our laws.

The public sentiment has come, in great part, from the work of this Board, by providing that annually this subject shall be brought to the attention of our citizens through the Report of a Specialist in Ornithology, which is published and freely distributed, and the growth of this sentiment is further augmented by the Bulletins on bird preservation by the Bureau of Zoology, of the State Department of Agriculture, by the work of our Pennsylvania State Branch of the National Audubon Society, and by the work of Dr. William Dutcher, of New York City, and other officers of the National Audubon Society, produced by the use of Leaflet Literature, which has greatly aided in maintaining the interest and widely disseminating information concerning birds and other untamed creatures.

We should make special mention of the excellent work of our State Game Commission, with Dr. Joseph Kalbfus as Secretary, in creating sentiment, and especially enforcing legislation for birds and game protection. That law which made it illegal for an unnaturalized foreigner to carry a gun in the State of Pennsylvania has proven of vast benefit to our agricultural resources in protecting our song birds and insectivorous birds, and has likewise greatly aided our State forestry interests, as these birds are even more essential for the destruction of woodland pests than for the destruction of those of the field or orchard, because with our modern methods of pest suppression, we are able to control most of our injurious insects of the orchards by the spray pump when occasion arises, but this is practically impossible in the woods.

ARE BIRDS KILLED BY SPRAYING?

At this point we should offer an answer to the above question which is now so frequently asked. It is sufficient for us to say that we have never been able to learn of any definite case of this kind, and if anyone should find dead birds near sprayed crops, where arsenical poisons have been used, and suspect their death to be due to this cause, we shall be glad to have such birds sent immediately to us at Harrisburg, by mail or express, for careful chemical analysis of the stomach contents.

Dr. E. H. Forbush, Ornithologist of the State Board of Agriculture, of Massachusetts, has published in his Annual Report of the State Ornithologist of that state for 1909, the results of his careful investigations along this line, after having very widely advertised for specimens of dead birds for analysis. His results are as follows:

"The investigations of the last three years have shown only two birds that were possibly killed by the arsenate of lead. When we consider the effective advertising that this investigation has had, the number of people who have been on the lookout for dead birds where spraying has been done, the few birds that have been received and the very small percentage (two birds) in the case of which the fatal poisoning by arsenate of lead seems even possible, it seems hardly worth while to continue the investigation."

BIRD COLONIZATION

Very successful results have attended the efforts of many persons who have attempted bird colonization, or at least who have done something toward providing for and retaining certain species of birds around their premises.

Among our recommendations in this practical and important line were the following: Erect for the wrens, small boxes or houses with the entrance not more than one-inch in diameter. This excludes the English sparrow. Erect boxes or leave old stumps or branches with holes for the bluebirds. Leave a few old snags for the woodpeckers, which are among our most beneficial friends in destroying the Codling moth and other insects of the orchard, as well as many forest tree pests. Plant a few of those shrubs, vines, bushes and trees that will afford, not only bird protection or concealment, but also bird food. Among these varieties are the service-berry, also

called "shad berry" and "June berry," and known botanically as *Amalanchier*; the hackberry, the wild grape, the English and American ivy, all possible varieties of mulberry and sweet, soft early cherry, such as the Governor Wood. Detailed statements of the methods of attracting birds were published a few years ago in the Monthly Bulletins of the Bureau of Zoology, a few copies of which are yet available for those persons especially interested. We were surprised and gratified at the showing of hands made last night in the meeting of the State Horticultural Association when Mr. Powell asked how many persons had wrens nesting on their premises. Over fifty hands went up.

THE ROBIN AND THE CHERRY

This has been the bone of contention, or *Bete noir* of the horticulturist. During the season while its young are in the nest and the robin must find food to meet its growing demand, ripe fruits of any kind are liable to be attacked. This can be avoided by planting sweet fruits which its prefers, and which ripen at the same season, such as the shad berry, the Governor Wood cherry, and early mulberry.

We have had many inquiries from persons who wish to aid the birds to colonize around their premises. The following is an example of a reply sent to an inquirer in Lock Haven:

"Replying to your recent letter concerning the erection of Martin Houses, I beg to say that the best way to induce the martins to nest around the premises is to erect houses suitable to their needs, and really I believe it is about the only means. These birds have no evil habits. They will not eat your bees, neither will they molest nor drive away your other birds. While they are wholly insectivorous, yet I have never known of a case of their being destructive to the honey bee. They are very interesting birds, and are worthy of your efforts for the propagation.

"If you wish further information on the subject, it would be well to write to Mr. Warren Jacobs, Waynesburg, Pa., enclosing forty cents for his booklet on Martin Houses, and Methods of Attracting Martins to the Premises. He has propagated them by the hundreds, and is very practical in his suggestions. I also shall be glad to aid you all that is possible."

In beginning this report we said that "with but one exception" the year has not been characterized by any remarkable feature of Ornithology in Pennsylvania. This exception, which becomes quite noteworthy because it is so remarkable, is the starvation of young insectivorous birds during the spring and early summer because the weather was so cold and wet that their parents could not find enough food for them. This is well expressed by a valued correspondent, Rev. J. R. Heckman, of Johnstown, Pa., who, under date of July 2nd, wrote: "The long, wet weather, with temperature much below the average, that has continued well up into June, has caused extraordinary happening, viz., the swallows were here about as in other years, but I have seen but one solitary swallow from the end of the cool weather up to the present time. It is thought that the unfavorable weather, probably, was a cause of the shortage of their food supply, which either caused them to starve or leave."

THE ENGLISH SPARROW

The English sparrow continues to be our greatest bird nuisance. Mr. Ira R. Foulk, of Schuyler, Northumberland county, wrote as follows:

"Is there any method of ridding our farm buildings and surroundings of the sparrows?"

"Sparrows are very annoying to us. They harbor about the buildings in a large flock, and in the spring drive all other birds away from here, such as bluebirds, wrens, etc.

"Thanking you in advance for an exterminating medium, if there is any, I am,

"Respectfully,
"I. R. F."

To this I replied as follows:

"Replying to your letter making inquiry for a method of ridding your premises of sparrows, I must say that I recognize the objectionable feature of these birds, and agree with you that it would be well to suppress or destroy them. The U. S. Department of Agriculture has issued a bulletin on this subject which can be had free by writing to Washington, D. C., for it.

"One of the most successful means of destroying the English sparrow is to poison millet seed by soaking it a short time in a solution of strychnine and water, and then mixing some of these poisoned seeds with ten times their bulk of unpoisoned seeds, and put them where the sparrows can get them to eat, but where they will not be dropped on the ground to be picked up by poultry. Various kinds of traps and snares have proven useless for sparrows, for the reason that these birds are too shy to be caught in numbers in any device of this kind.

"Proper precaution in destroying or preventing nesting sites for sparrows is one means of preventing their multiplication around the premises. Often the corner of a building near the roof furnishes a place upon which a nest can be placed, while this could be prevented by boarding up or covering with a screen of coarse wire. Holes in walls or trees or buildings afford excellent places for sparrows to nest, but these could be closed by fastening over them a board with an opening one inch in diameter. This would permit the wrens to enter while the sparrows would be obliged to stay outside.

"It is not difficult to find the nesting places of these birds when they commence nesting in the spring time. A person can easily watch them and see them carrying straws, feathers, etc., to their nests. It is best to locate them, and then wait about two weeks, and then destroy them, and the eggs or young will be destroyed with them. Some persons go so far as to place favorable nesting boxes for the sparrows, where they can be reached and the contents removed at night at regular intervals during the nesting season. Thus the sparrows, not seeing the disturber of their nests, and not knowing it is a human being, are liable to continue nesting at the same accessible place.

"Four years ago Hon. Mr. Barnhart, of Johnstown, introduced a bill providing for the investigation of the habits of the English sparrow, and looking toward methods of its destruction. Very unfor-

unately this bill was ridiculed to death. It was, as you can see, a good and important bill, and would have been of immense value. I hope to see something further undertaken by this Legislature."

RABBITS KILLING TREES

There was considerable complaint last year concerning rabbits killing trees, and there is at present a popular tendency to paint the trunks of trees with axle grease to prevent this. Our recommendations have been against the use of axle grease on trees, for the reason that it is not of uniform composition, and while one brand may be safe on a tree another brand may destroy it. Also, there are known and tested methods of preserving the trees from injury by rabbits, and it is better to follow known methods, and leave the experimenting to those who are trained in experimental work, and will do it carefully and properly.

From a correspondent in Hanover, York county, we received the following letter:

"Last winter I used axle grease to paint young trees, and keep the rabbits and mice away, and I noticed it burnt the bark. Can you recommend something better?"

Our reply was as follows:

"Replying to your recent letter, I note with interest that you injured the bark on your trees with axle grease applied last winter to keep away mice and rabbits. I have had this experience at other times, and this is why I have not recommended it. You do not state whether your trees are apple or peach, but I can say that you would have no difficulty nor bad results in painting your apple, pear and quince trees with pure white lead and raw linseed oil. It will keep the mice and rabbits away, and will also keep out borers, and will not injure the trees. I have used it on my peach trees without injuring them, but for some reasons can not feel sure in recommending it to others for peach and plum.

"Spraying or washing with the boiled lime-sulfur wash, home-made or commercial, will effectively protect your peach trees. Tramping straw down around the trees will protect them from mice, and cutting off branches from old trees, which may need to be pruned away anyhow, and dropping these on the snow in such a way that the snow will not entirely cover them, will often bait or feed the rabbits in such a way that they will not attack the trunks of the trees.

"Rabbits generally do not gnaw trees until the snow has been on the ground for some time. This will give you an opportunity to hunt them and destroy them. I certainly recommend killing rabbits as pests at any time of year they are to be found injuring an orchard. I understand that it is not against the Game Law if they are killed because they are injurious to the trees."

THE PROPOSED STATE GUN LICENSE LAW

The Game Commission and others have proposed that Legislation be enacted providing for the licensing of guns to be used for the purpose of hunting in this State. In general, it provides that a

license fee of one dollar be paid by any person hunting in Pennsylvania, excepting on his own premises. This law would result in preventing hunting by many careless and irresponsible persons, and especially would make it possible for landowner to ascertain the name of the hunter immediately upon demanding to be shown his license, which according to the provisions of the law he is to carry with him when hunting. It would thus give protection to the farmer, such as he does not now have. At the present time it is impossible for us to protect our premises, livestock or families from the unknown gunners, who are often as fully bound upon errands of destructive trespass and petty thievery as upon the mission of hunting. We have no way of learning the names and addresses of such persons, and there is no method by which we can arrest them on the spot. To be obliged to go to town to swear out a warrant for their arrest, means to give them time to escape into the next township or county, or to other regions unknown, before we can return.

The Gun License Law would also provide funds for the payment of wardens and bounty, and would certainly result in giving the farmers better protection and increase game, which are desirable. We, therefore, recommend the co-operation of this Board with the Game Commission and others in securing the passage of such legislation.

LEGISLATION FOR A LICENSE OR TAX ON CATS

It is well known that among the most destructive enemies of the birds in the populous residence districts, and on farms or orchards are house cats, which in many cases are half starved and run wild, are forced to capture birds for their food. If legislative acts can result in preventing the forsaking of cats along highways, abandoning them when moving, or permitting an increase beyond a desirable number, this will certainly be useful in bird preservation, and is, therefore, to be recommended. All of which is hereby respectfully submitted.

MR. HUTCHISON: What do you mean by the gun license law?

PROF. SURFACE: I mean the proposed law now in the hands of the Game Commissioner providing for a license fee of one dollar to be paid by each person who is to carry a gun and hunt in Pennsylvania.

MR. HUTCHISON: You endorse that, do you?

PROF. SURFACE: Yes, sir.

MR. HUTCHISON: Including the owner of the property?

PROF. SURFACE: The law includes the owner. That feature I do not endorse. I do not think the man ought to be obliged to pay a license to hunt on his own property.

MR. HUTCHISON: You know the proposed license law will cover everybody with no exceptions in it?

PROF. SURFACE: Yes, sir.

The CHAIRMAN: You have heard the report. What action will you take upon it?

MR. HUTCHISON: I move that the report be received and published in the journal of our proceedings.

MR. GLOVER: I second the motion.

MR. HUTCHISON: Mr. Chairman, before that motion is put I would like to know the status we occupy at this time. There are certain recommendations in that paper, and will it be taken for granted if we vote in favor of this motion that these recommendations are made by this Board?

The CHAIRMAN: I don't think that is the understanding.

MR. HUTCHISON: I don't think that it would be our endorsement, because I cannot endorse that portion of the report that places a burden upon the tax-payer there and the citizens of this Commonwealth that that recommendation would do. Though you may not own farms near cities and desire the hunter to come out and trespass, yet you think for a moment the pleasure that that man has. He may be a laboring man, working in the mines, as near where I live. I have forty acres of land lying near a mine bank where these men labor with their hands and I never put a notice up. There were twenty-four turkeys on there last year—there is nothing selfish about me—and I allowed them to go on there, and they go a day or so at a time and only two got a turkey. If you start to work in this State to place a tax on every man who goes to hunt for a day or two think what trouble we will bring down on our heads and what little benefit it will be to us. In the first place I don't think this bill will get into the Legislature or come out of the committee or become a law, because in the city of Altoona I see through the daily paper there are forty-five petitions signed by hundreds of people protesting against this and there are hundreds of others going up all over this State against this measure to take one dollar from each man that goes out to hunt. Don't let us go on record as taking away that liberty, that pleasure from our fellowmen; the men who labor hard and toil ten hours a day to purchase enough to live on, and we who are more fortunate and live out in the open country ought not to make him pay a tax when he comes out to hunt a little in the country.

The CHAIRMAN: I wish to say that I sat with the Legislative Committee last night until about midnight and we got chuck full of this hunting law and I think the Committee will give a report here on that subject that you can act on and vote for or against it. There have been enough suggestions and amendments offered to make a volume in our law book.

MR. WALLACE: Might I ask Prof. Surface a question: I would like to inquire whether in throwing poisoned millet seed about there would not be danger of poisoning other desirable birds as well as the sparrow?

PROF. SURFACE: We think there would be very few seed-eating birds that would be feeding at that time of the year. If put out in the fields in winter time there would be danger of killing the field sparrow and song sparrow as well as any other sparrows, but around our buildings I think there would not be.

The CHAIRMAN: Any other questions? We will have to move along.

The next number on the program is the Report of the Entomologist, Prof. Franklin Menges, York, Pa.

PROF. MENGES: Gentlemen, I shall discuss this question from the economic side more than any other.

Prof. Menges then read his report as follows:

REPORT OF ENTOMOLOGIST

By PROF. FRANKLIN MENGES, York, Pa.

Insects of every description that usually infested this State continued their depredations during the year 1910, with as much fervor as in any previous year. The San José scale and all other scales, the aphides of every description, the potato bug, the cut worm, the loop worm, the wire worm, the cabbage root maggot, the apple and peach tree borers, the codling moth and the clover root borer, all of them and many others have plied their trade of destruction, and in many instances laughed at our poisonous interpositions. These in many instances were accompanied with fungus diseases more deleterious in their effect in many places than the insects.

The relation of insect and fungus diseases in plant life is so intricate, and in many instances with our present knowledge and with our instruments for observation well nigh beyond our ken. We know that in order that fungi may successfully attack plants, the plant substance must be in a condition to be attacked, and usually climatic and moisture conditions must be favorable for the special fungus to propagate itself. On the other hand when soil and climatic conditions are exactly right for the plant to grow and develop and ripen new tissue quickly, this tissue will be sufficiently strong to resist infestation and the infesting bacterium can do little or no damage. But, however salient soil conditions may be and however solubrious climatic conditions they do not prevent insect infestation, and when plants weakened and wounded by insect depredations the parasitic fungus has prepared for itself a way in the open wounds of insect attacks into which it can and will plant itself, and together insect and fungi will soon, if not checked, weaken the plant and make it valueless or entirely destroy it.

The San José scale and the bird shot blight are concomitants, and the potato bug and potato blight. In the case of soil conditions and fungus disease, the pear blight seems to be dependent well nigh entirely for its development on soil conditions. But not only do insects and fungi act as concomitants, but the insecticides and fungicides, the very substances used for the destruction of these enemies of tree and vegetable life, very frequently have deleterious effects. We take it that whatever the compounds of copper, whether as we used to think, it is the hidroxide, or as Prof. Pickering of England

thinks, that a series of basic sulphates are formed by the precipitation of the copper by the lime in making Bordeaux mixture, that when upon the trees or plants these become soluble by the action of carbon dioxide and moisture and therefore are present in the plant substance and available when needed to check the development of parasitic fungi. In other words the plant is put into a condition to resist parasitic infestations and insect depredations. As already stated whatever the conditions produced in the plant to resist fungus infection the substances that check this infection have a deleterious effect on the plant organs.

In a trial of tree spraying mixtures for fungus diseases, standard Bordeaux mixture made of four pounds copper sulphate and four pounds stone lime and fifty gallons water, Bordeaux mixture and iron sticker made of two pounds copper sulphate and four pounds iron sulphate and six pounds of stone lime with fifty gallons water, and self-boiled lime and sulphur made of ten pounds stone lime and ten pounds sulphur and fifty gallons water, the following results were obtained:

On the apple trees of the same variety in the same orchard on the same kind of soil those sprayed with the self boiled lime and sulphur the fungus diseases were not entirely kept down, but there were no obvious injurious effects on the trees. Those sprayed with the iron sticker and Bordeaux mixture the fungus diseases were kept down and there was little injury to the trees. But the trees sprayed with straight Bordeaux mixture were nearly entirely defoliated. These occurrences are not uncommon, but are by no means conclusive. The iron sticker, which by the precipitation of the iron in the sulphate by the lime water becomes the gelatinous ferrous and ferric hydroxides, is added to hold the insecticides and fungicides for a longer time and in this way prolong tree disinfection and insect destruction. It is obvious from this that in order that spraying in the future may be more efficient that the greatest care and keenest observation is demanded so that we do not inflict greater injury than the bacterium we are trying to destroy would have inflicted, especially is this so as long as we are obliged to use disinfectants that are injurious to the trees, the foliage and the fruit. I said disinfection of trees. I like the term because it brings us face to face with the conditions that confront the physician. He disinfects the room in which patients have been ill with so-called bacterial diseases in order to prevent the disease from being conveyed to others. Here another avenue for investigation opens up into which we have now not time to enter.

An illustration of the effectiveness of insect poisoning and fungus disinfection came under our observation in York county in 1909 and 1910. In one section of this county there was considerable complaint that Paris green did not kill the potato bugs and in some instances even Bordeaux mixture when applied sufficiently early did not in any way check potato blight.

In 1909 there was a scarcity of Paris green in the potato growing section of York county and dealers were obliged to scour the country to secure enough to supply the demand. Over 7,000 pounds were used in one section during this year.

In the vicinity of Brogueville and Cross Roads, York county, a number of farmers whom we visited told us how potato spraying had well nigh completely failed, in fact seemed to have done more harm

than good. Six samples of the Paris green used by as many different farmers were analyzed and the lowest percentage of arsenious oxide combined with copper was fifty-three and seventy-three hundredths (53.73) and the highest fifty-six and twenty-two one-hundredths (56.22), or 3.73 per cent. and 6.22 per cent. higher than required by the State law. This showed that the composition of the poison was all right and that the cause of its failure to kill the bugs must be due to something other than the composition, which was found to be the case. It was found that approximately twenty per cent. of these samples of Paris green did not pass through a screen of one hundred mesh to the inch. In order to make certain that finer grinding was necessary samples of finely ground Paris green were compared with these samples and where the finely ground poison was used the bugs were killed, while those on the plant sprayed with the analyzed Paris green were not killed.

This coarsely ground Paris green was mixed with water, even when constantly agitated the larger particles would sink to the bottom of the barrel and carry with them large numbers of smaller particles. But what was still worse, when these coarse particles were sprayed on the potato leaves they formed centers around which collected a large number of smaller particles making the Paris green so dense that it burned the potato leaves and prepared pores for the attack of potato blight. Not only is this coarsely ground Paris green the cause of trouble with potatoes, but it certainly can not be as effective for killing codling moth and other insects. It should, therefore, be insisted that the Paris green be ground to an impalpable powder so that it will easily pass into the cutting or chewing organs of the insect or larva; that it may be evenly distributed over the foliage and fruit of plants, that it will not burn the organs of the trees and plants and in this way itself do some of the injury for which it is applied and prepare the way for the attack of parasitic fungi as it evidently did in the case referred to.

These observations are not as conclusive as they should be, but from reports of other potato and fruit growers, it appears that we must learn better to prepare these spraying mixtures, or something else must be gotten instead of the sprays now used, that will not injure foliage, fruit or trees; but rather be a benefit such as the self-boiled lime and sulphur spray is.

The CHAIRMAN: You have heard the report, gentlemen. What action will you take upon it?

MR. A. P. YOUNG: I move it be received and published in the journal of our proceedings.

The motion was seconded, put and agreed to.

The CHAIRMAN: The next number on the program is "Some Fundamental Principles in Fertility Maintenance," by Dr. Charles E. Thorne, of the Ohio Experiment Station. As you were informed yesterday, Dr. Thorne is unable to be with us on account of illness in his family, but his assistant, Prof. R. C. E. Wallace is here in his stead and will deliver this address.

Prof. Wallace then spoke as follows:

SOME FUNDAMENTAL PRINCIPLES IN FERTILITY MAINTENANCE

By R. C. E. WALLACE, *Ohio Experiment Station, Wooster, Ohio.*

"The soil is the farmer's business capital. He has invested his money in the land and to it he must look for his returns." What these returns will be depends largely upon the farmer himself.

If he is to adopt a profitable and permanent system of agriculture, he must put into practice the underlying principles which have been found to be absolutely essential and fundamental to the greatest success in the production of crops. He must not be content to maintain the soil in its present state of fertility, but should, if possible, add to the fertility already at hand and thereby increase the productive power of the soil.

One of the well recognized means of bringing about this result—of increasing the productive power of the soil—is that of tile draining! The presence of free water is decidedly harmful to most plants, especially if allowed to stagnate near the surface. When the level of free water is near the surface of the ground, great benefit is almost certain to result from some system of underdrainage. So far as we are aware, none of our agricultural plants will send their roots below the water level; but by means of drains we can lower the water table and so increase the depth to which plant roots may feed. By lowering the level of the free water in the soil we not only increase the amount of root pasturage but open the way for the admission and circulation of air in the soil spaces; a condition absolutely essential to root development.

The admission of air to soils also assists in hastening the decay of organic matter and in the production of nitrates. A soil charged with surplus water is always cold, and the influence of drains in warming the soil is very decided, especially in the spring. More heat is required to raise the temperature of a given weight of water one degree than is necessary to cause the same increase in temperature in an equal weight of soil. Hence a soil surcharged with water remains cold in the spring much longer than well drained soils because the heat from the sun which should go toward warming up the soil is absorbed by the evaporation of moisture. The entire time allotted to this paper might well be devoted to a discussion of this question of drainage, but there are other factors to be mentioned relating to the maintenance of soil fertility, so that we may not linger longer on this phase of the question. But just in passing permit me to urge upon you the importance of thorough drainage. In my judgment it is the first and most important question to be considered in establishing a permanent and profitable system of husbandry.

TILLAGE

Tillage includes all the operations of plowing and preparing the ground for the reception of the seed and the subsequent cultivating of the soil. Good tillage is one of the most efficient means of assisting nature in rendering plant food available. The first effect of tillage is to improve the texture of the soil in the mere mechanical sense; that is, to make it fine and mellow so that the roots of plants may readily pass through it, and that air and water may be more readily admitted; thereby improving the conditions for root development and for the multiplication of beneficial organisms. Some soils are so stiff and heavy that neither roots nor water can easily penetrate them; others are so loose and open that they have very little capacity for retaining moisture. In either case tillage is highly beneficial, especially if accompanied by the incorporation with the soil of liberal quantities of organic matter. Surface cultivation and the establishment of a dust mulch is especially desirable during periods of drought at any time during the growing season.

Man has not yet reached the point where he can regulate the amount of rainfall which falls upon the earth; but by proper tillage methods he can greatly assist the soil in absorbing the maximum amount of that which does fall and at the same time reduce the loss from surface washing; and further, by the establishment of a dust mulch he can in a large measure succeed in holding this moisture in the subsoil for the use of the crop in case of drought.

LIMING

As a means of correcting soil acidity, and as an aid in improving the physical condition of many soils, we have yet to find a substance that is more efficient or economical than ordinary builders' lime. When lime in this form is applied to a rather heavy clay soil it tends to flocculate the fine clay particles by cementing them together into small granules thus making the soil more easily tilled and less liable to bake and crack. In the case of a clay soil, this treatment serves to render the soil more open and porous, thus permitting a freer admission of air and allowing the water to percolate through it more readily. In this sense we can readily see that on such soils lime becomes an important adjunct to thorough drainage. On sandy soils, however, lime has an opposite effect. Such soils are frequently benefited by being rendered more compact, and hence have a tendency to become less leachy in character and to be more retentive of moisture. It should be the aim to increase the organic matter in such soils by the use of stable manure or by the occasional plowing under of green crops.

When viewed in the light of present experimental evidence, by far the more important reason for applying lime to the soil is for the purpose of counteracting the evil effects of free acids which may be present. When the remains of plants undergo decay upon soils deficient in carbonate of lime and magnesia, acid or sour humus is liable to be produced which is a condition particularly obnoxious to most agricultural plants. Such a condition is especially likely to

occur when heavy crops of green manure are plowed down, particularly in hot weather. In such cases liming is an effectual and probably the most economical remedy.

Our experiments on Ohio soils have been shown conclusively that where an application of plant food is required some form of available phosphorous must receive first consideration; but where soluble phosphates are applied to soils deficient in lime and magnesia the phosphoric acid combines with the iron and alumina of the soil to form compounds that are not readily utilized by plants. If, however, the soil be fairly well supplied with lime and magnesia this transformation is retarded so that the plant is afforded an opportunity to utilize much of the phosphoric acid before it becomes unassimilable, the effect of the lime in this case being to assist in maintaining fresh applications of phosphoric acid for a considerable time in a more available form.

In many parts of Ohio, and especially throughout the entire eastern half of the state, it is becoming increasingly difficult to get a good stand of clover where no lime has been applied. On soils which have received a dressing of lime, however, clover will grow luxuriantly even though it refused to grow before the lime was applied. I would say, therefore, especially to those who have trouble in securing satisfactory crops of clover, that they might do well to investigate this question of applying lime to the soil as I should expect much benefit from its use in cases similar to those which I have indicated.

ROTATION VS. CONTINUOUS CULTURE

(For this portion of his address Mr. Wallace displayed a number of charts showing in detail the results of the experiments discussed.)

At the Ohio Station we have two series of tests which have now been in progress for seventeen years, that present some interesting facts as to the value of rotation as compared with continuous cropping both with and without the use of fertilizers and manure.

In one test we have established a five-year rotation of corn, oats, wheat, clover and timothy, and in the other corn, oats and wheat, each having been grown continuously on the same ground for the entire period of the test.

Under rotative cropping the average unfertilized yield of corn has remained practically unchanged for the entire period. The average annual yield at the end of the first five-year period was 31.89 bushels per acre; at the end of the third period the yield was 31.04 bushels per acre—less than a bushel difference between the first and the last period—a difference so small as to make it unsafe to attach to it any particular significance. In the continuous culture plots, however, both the unfertilized yield of corn and wheat show a rapid decrease in yield, the average for the third period being only about half that of the first.

On the fertilized plots the nitrogen is applied at the same rate per acre as Plot 11 in the rotative cropping, and on Plot 2 in the continuous culture, but the corn and oats grown continuously receive more phosphorus and potassium than the same crops in the rotation. At the end of the first five years the corn had yielded slightly more,

on an average, in the continuous than in the rotative cropping and the oats and wheat nearly as much. During the second and third period, however, all the crops in the rotation have made steady and constant gains while the yields on the continuous culture plots have, with the exception of oats, been gradually going down, notwithstanding the heavier application of fertilizer. In the following table are given the yields for each of the three five-year periods both for Plot 2 of the continuous cropping and Plot 11 of the rotation:

Crop.	Continuous Culture, Plot 2.			Five Year Rotation, Plot 11.		
	1st 5 years.	2nd 5 years.	3d 5 years.	1st 5 years.	2nd 5 years.	3d 5 years.
Corn, -----	bus. 41.61	bus. 47.20	bus. 38.50	bus. 41.28	bus. 43.90	bus. 54.13
Oats, -----	42.22	40.11	45.46	43.61	52.48	53.49
Wheat, -----	19.78	21.90	17.41	20.33	27.46	33.10

In the case of plots receiving barnyard manure comparison is made between Plot 20 in the rotation work, which receives a total of eight tons of manure every five years—four tons each on corn and wheat—and Plot 6 of the continuous culture which gets five tons of manure every year, or twenty-five tons for the five-year period. This rate of manuring has caused the corn yield to rise steadily from less than 39 bushels per acre for the first period, to more than 50 bushels for the third under rotative cropping, whereas the corn under continuous culture has fallen from 43 to 34½ bushels during the same period despite the fact that the plot growing corn continuously receives more than three times as much manure every five years as the corresponding plot in the rotation received for all the crops grown during the same period.

In the rotative cropping the oats crop is not directly manured, receiving only that left by the preceding corn crop—and, so far as I am aware, all our experiments agree in showing that the crop which is directly manured or fertilized receives the major portion of the benefit from the treatment—hence the comparison in this case should be made with Plot 18 in the rotative cropping, which receives eight tons of manure each on corn and wheat, or sixteen tons every five years, against the twenty-five tons applied directly to the oats continuously during the same period. This secondary effect on the oats, of manure applied to the preceding corn crop is shown by the results to be even greater than is the direct effect of the larger quantity applied directly to the oats as we do in continuous culture.

The manured wheat shows a little larger yield in the continuous than in the rotative cropping during the first period. At the end of the second period the wheat in the rotation was slightly ahead of the continuous, while at the close of the third period the yield of the continuous wheat was little more than half that in the rotation.

It thus appears that not only has there been a much greater decrease in the unfertilized yield under the continuous than under the rotative cropping, but that the effect of fertilizers and manure has been much less on the crops grown continuously than on those grown in rotation.

It has not been uncommon during the progress of our fertility work at the Ohio Station to frequently have grave doubts expressed as to the applicability of our plot methods to practical farm operations where fields several acres in extent are cultivated. In order to demonstrate that the plot methods were as entirely applicable to large as to small areas, we began putting into practice on a 40-acre field some of the lessons we have learned from our plot work. This forty-acre tract is divided into four sections of ten acres each on which is practiced a four-year rotation of corn, oats, wheat and clover. For the first ten years after the establishment of the Experiment Station in its present location our practice on this field was to top dress the ground for wheat in the fall, with ten tons of barnyard manure, the other crops following without any further fertilization. Seven years ago we adopted a different plan and began putting into practice some of the lessons above referred to. This consisted in applying ten tons of phosphated manure per acre to the corn ground in the fall, at a cost for raw rock phosphate used of \$1.60. After the ground was plowed in the spring we applied one ton of lime per acre, costing \$6.00. In the fall the wheat ground received a dressing of 400 pounds per acre of fertilizer analyzing 4 per cent. ammonia, 16 per cent. phosphoric acid and 5 per cent. potash, all costing \$6.40, making a total cost of \$14.00 per acre for the entire rotation.

In comparing the results of the two methods we find that for the first ten years before the change of plan the average yield per acre for the entire period was 48 bushels of corn, 52 bushels of oats, 20 bushels of wheat and 2.7 tons of hay; the average of the last seven years since the adoption of the new method, has been 73 bushels of corn, 56 bushels of oats, 37 bushels of wheat and 3.7 tons of hay. Figuring the total value of the increase at the average of prices for the past few years we get a total of \$64.00 for the gain. The cost of treatment we have seen is \$14.00. The net gain therefore would be \$50.00 per acre for the four crops of the rotation, or \$12.50 per acre for each crop each year. This is a greater net return than has been received from any of the plots under test at the Ohio Station, and demonstrates conclusively that good tilling and thorough fertilization are fully as practicable and applicable to large as to small areas.

A Member: Were these experiments all conducted on a well drained soil?

MR. WALLACE: Yes, sir; the land is all drained, the tile being laid 36 feet apart.

A Member: How much lime do you use and how many years between applications?

MR. WALLACE: We think one ton of burned lime or two tons of ground limestone per acre is about the proper quantity for our soil for the first application. For subsequent applications perhaps half these amounts might be sufficient if applied not less frequently than

once in from four to six years. The amount and frequency of application will depend much upon the character of the soil and its need for a lime dressing.

A Member: Does ground limestone rock produce the same effect as burnt lime?

MR. WALLACE: Ground limestone is much less vigorous and more lasting in its action than the burned lime. There is probably no great difference in their ability to correct acidity.

A Member: Has not the burned lime far more effect in improving the mechanical condition of the soil?

MR. WALLACE: Yes, sir; I think there is no doubt of that.

A Member: Do you consider it necessary to lime as long as you can grow good clover without it?

MR. WALLACE: Under ordinary conditions I should hardly expect lime to be very necessary where we can grow heavy crops of clover.

A Member: There seems to be a disagreement as to whether acid phosphate has any effect in promoting acidity in the soil. I should like to have your views.

MR. WALLACE: Where acid phosphate is used continuously for a number of years it will probably have a tendency to increase the acidity of the soil. However, whether we use acid phosphate or not, we find it necessary to use lime and the small amount of free acid which might accumulate in the soil from the continuous use of acid phosphate is so easily counteracted by lime that we do not hesitate to use the acid phosphate.

A Member: Do you think we get enough lime in our soil by the use of fertilizers such as rock and bone meal for the use of crops, without considering the acidity?

MR. WALLACE: With the use of such fertilizers as you suggest, together with the lime naturally present in the soil, I should expect the supply of lime to be sufficient for the needs of the plant if we leave out of account the question of acidity.

A Member: Does a limestone soil ever get acid?

MR. WALLACE: Yes sir. Soils of limestone origin have been known to become acid after years of cultivation. Limestone is slightly soluble in the soil water and where the soil is subjected to thorough tillage for a number of years the lime originally present is likely to become dissolved out of the surface portion even of the limestone soils and carried down into the lower strata.

A Member: There is one of the instructors of the Farmers' Institutes in this State who advocates the application of only 500 pounds of lime per acre.

MR. WALLACE: No doubt there are cases where an application of 500 pounds would be sufficient; on our lime-hungry soils of Ohio, however, we get very little, if any, result from so light an application.

In cases where lime is applied in small amounts as you suggest, it is necessary to make the applications more frequently than when we apply from 1,000 to 2,000 pounds.

A Member: Do you plow your ground before applying the lime?

MR. WALLACE: Yes sir. After the ground is plowed we apply the lime and work it well into the surface of the soil with a disc or spring tooth harrow.

The SECRETARY: This, I think, completes our program for this afternoon. We will have a few minutes before adjournment. I think there is a gentleman in the audience from Perkiomen Academy, an institution of learning in the eastern part of the State, who has a message to deliver. We would be glad to hear from him for eight or ten minutes.

I have the pleasure of introducing to you Prof. O. S. Kreibel, of Perkiomen Academy, Pennsburg, Pa.

PROF. KREIBEL: I want to say just a word to you this afternoon along the line of agricultural extension in school work. Perhaps I ought to say that I am principal of a preparatory school in Montgomery county which ex-Governor Beaver visited some years ago and made an address to the graduates. We have prepared a great many young people for college, many of them farmers, since we are taking the boys away from the farms. It is all right. They make their mark when they get out. They make the best records. At State College and Princeton they made good in scholarship. It is usually the boy from the farm who makes good. We are thinning our country of the best boys and sending them to the cities. If we don't reverse the operation soon we will impoverish our country districts at the expense of the cities. It has occurred to me if we could have some agricultural teaching in connection with schools like ours have some small farms, a farm for dairying, a farm for poultry, a farm for raising cattle, we could interest many boys in that line of work and get a lot of boys to come to these farms and work part of the time and study part of the time and get ideas of scientific agriculture to take back to their farms. We should need a lot of men from State College to teach at these places; and if we had one in every two or three counties of the State it would do a great deal for agriculture that we cannot do now. The State College cannot do it because our boys cannot all go there. They must train men to teach in these subsidiary schools, and I just came here to present this in brief form.

Would it not be a good thing? For instance, if you had such a farm in Perkiomen Valley for three or four counties, and another school in another section, would not these schools be favorable for State College and ought not State College work with such schools and thus carry the message of importance throughout the State to the masses. We have the colleges and the colleges can prepare the teachers for the schools. Now, then, we are going to teach agriculture in the public schools. This, in brief, is my thought. Why should not the State enter upon a regular system of extending our agricultural instruction? They are doing it in other states. Massachusetts has a committee appointed. I have been in correspondence with them and they are to report this winter to the Legislature. They have schools in

Wisconsin, county schools on the same line and organized on the same basis. What I am afraid of is that Pennsylvania will be in the rear of this procession, whereas it ought to be up front. Why should we not be in the lead? We have a great State; we have a great people, a great agricultural people. It needs development, particularly in smaller farms, more successful agriculture, and it seems to me that if the State Board would see its way clear to endorse such a move it will do a great service to the farmers of the State.

The SECRETARY: Now, Mr. Chairman, I want to make a little announcement. I cannot understand why it is that people are so indifferent to their interest as to leave so much upon the table for the Secretary or somebody else. First, we had to send some money to hunt an owner and just before we left the room after adjournment this forenoon I discovered a gold watch upon the table and I have no need for more than one. I have an idea that this is Mr. T. E. Martin's watch, but I don't know. If any of you gentlemen see Mr. Martin, speak to him. If it is not Mr. Martin's watch I would like to know who the owner is. I don't want to carry more than one watch.

Another thing: Immediately upon adjourning here we will go up to the large hall on the second floor, where there is to be the inauguration of the good roads campaign, and we hope that the State Board of Agriculture will have its place there in this important work of starting this train in the right direction.

The CHAIRMAN: What is the pleasure of the Board now?

MR. HUTCHISON: I move we adjourn.

The motion was seconded, put and agreed to.

Whereupon, adjourned until to-morrow morning at 9.30 o'clock.

Thursday Morning, January 26, 9.00 A. M.

A. J. Kahler in the Chair.

The CHAIRMAN: The meeting will please come to order.

The first item on the program this morning is the Report of the Botanist, Prof. W. A. Buckhout, State College, Pa.

The SECRETARY: Prof. Buckhout is not here. I have a letter stating it will be impossible for him to be with us, but he has sent me his report. I would suggest that Mr. Hutchison read it.

The CHAIRMAN: It is suggested by the Secretary that Mr. Hutchison read the Report of the Botanist.

The SECRETARY: If there are any scientific terms in the report which you are not familiar with, you may skip them. I have not read over the report, hoping that there would be something to take up the time until I could become familiar with it.

The Report of the Botanist was then read by Mr. Hutchison, which is as follows:

REPORT OF THE BOTANIST.

By PROF. W. A. BUCKHOUT.

The activities of your Botanist have been directed entirely to correspondence. This varies little from year to year, and generally runs somewhat parallel to the season. Some lines of inquiry are not at all seasonal, but those most frequent are. In spring and fall specimens of seed for purity and character are quite abundant, and during the height of the growing season weeds or conspicuous native plants for naming come in quite rapidly, generally coupled with the inquiry, how can they be exterminated?

Of the miscellaneous inquiries, those relating to special crops are the commonest, and of them mushrooms and ginseng take the lead.

Of the former, the following correspondence expresses my judgment so tersely that I venture to quote it entire, although the context shows that it has already been in print:

To Raise Mushrooms

To the Editor of "The Press."

Sir:—Can you give me an answer to the following questions regarding mushrooms?

1. Are they hard to raise?
2. Is raising them profitable?
3. Is there a good market for them?
4. What price do they bring?

Will be glad to receive any information you can give me on this subject.

A. F. H.

Philadelphia, August 29, 1910.

This question was submitted to the Pennsylvania State College, and Mr. W. A. Buckhout, of the Department of Botany of that institution, sends the following reply:

"Replying to the inquiry of your correspondent 'A. F. H.' respecting mushroom growing, I would answer as follows:

- "1. Not particularly, for those who understand the business.
- "2. In the long run, yes, but partial or even complete failures are not uncommon.
- "3. The market is rather narrow and select.
- "4. The rate, 15 to 50 cents per pound, wholesale, is about the winter's range.

"Your correspondent is evidently a novice. If he desires to proceed further in the matter he should do two things. (1) Visit some mushroom growing establishment and study it thoroughly; (2) write to Department of Agriculture, Washington, D. C., for Farmer's Bulletin No. 204, 'How to Grow Mushrooms.' Mushroom growing is no more like ordinary cropping than cattle raising is like oyster culture."

I should give substantially the same advice regarding ginseng, golden seal, peppermint and others. Each is in a special class by itself, and no one should expect to be able to handle it successfully without the special knowledge which careful observation and experience give. But, over and over again, someone chances on the highly seductive advertisement or newspaper tale of the making of "big money" on a small plot of ground in raising this or that special crop. Deceived by the more or less exaggerated accounts, which carefully avoid any reference to the need of caution, and gratuitously offer their one-sided experience, some, I am satisfied, rashly make the venture which only the most dogged persistence in the face of years of discouragement can turn to success. The same time, money and energy put into some of the albeit common crops would generally give, in the long run, more satisfactory returns.

It is gratifying to see that the necessity, as well as the advantages of pure seed, is becoming increasingly evident to farmers and gardeners. Many have come to have a wholesome fear and dread of dodder, and hence to scrutinize clover and alfalfa seed very carefully before they use it, and to require some warrant that it is free from at least this pernicious pest. Weeds, like the poor, we shall always have with us, but reasonable care in the purity of seed used, careful cultivated crops, and due regard to maintaining soil fertility will so hedge about and restrict them that they need not be feared. I have little faith in the practicability of weed destruction by spraying, at least under the ordinary conditions which appertain in Pennsylvania, whatever may be the case in the large, uniform, unobstructed fields of other regions.

When one considers the resisting power possessed by our old weeds so long entrenched and habituated to their surroundings, it seems idle to expect to control them except by the most vigorous counter-acting measures, such as have been used for all time. Spraying with iron sulphate, salt and the gardener's weed killers of various sorts may have their place, but only where the conditions are fit, and then one must carefully count the cost of machinery, materials and time, or he will be left in the lurch. Unsatisfactory as such replies may seem to be to my anxious inquirers, I can seldom answer them in any other way. So long as life is a struggle and a competition, so long must the obstreperous weeds be crowded out and kept out by stimulating our useful plants to their most vigorous growth. Specifics have small place in weed killing.

From time to time I get specimens of grass containing ergot or spurred rye. So characteristic and so plain are such diseased grains that it seems strange so few farmers or farmers' boys recognize them on sight, the more so since ergotted grains are such insidious poisons and in all probability are the frequent causes of the sickness of animals and sometimes of their death. It is true that well con-

ditioned animals with a liberal food supply are generally discriminating enough to reject ergot, but it must sometimes happen that an over hungry animal or a weaker animal crowded by its fellows may snatch, hastily masticate and swallow the ergotted material which, if at ease and leisure, it would reject.

In the last few years I have had several cases of ergotism reported to me, and your veterinarian has likewise recorded a number of very pronounced examples. I shall not take your time to rehearse them, but should any of you be directly interested you will find these cases in former volumes of your proceedings; my own in Report of Pennsylvania Department of Agriculture, 1906, page 340, and that of Dr. Pearson in the Report for 1902, Part 1, page 161.

Few instances could more conclusively show the value of some practical knowledge of botany and zoology. We are making some progress in getting such facts as these before the people, and in getting the people stirred up to pry into such matters for themselves. But the losses to farmers due to ignorance of 'natural phenomena and natural principles is still appalling.

The CHAIRMAN: You have heard the report. What action will you take upon it?

MR. HUTCHISON: I move that the report be received and printed in the journal of our proceedings.

The motion was seconded, put and agreed to.

The SECRETARY: Mr. Chairman, at the afternoon session on Tuesday the Report of the Economic Geologist, Dr. Isaac A. Harvey, was called for and the statement made that he was not present, but that he had promised to send in his report which had not at that time arrived. That report is here this morning and if it be your pleasure I will read it or it can be received without reading, if you so desire.

MR. BLYHOLDER: Mr. Chairman, I move the report be received and published in the journal of our proceedings.

The motion was seconded, put and agreed to.

The report of the Economic Geologist is as follows:

REPORT OF ECONOMIC GEOLOGIST

By DR. ISAAC A. HARVEY, *Lock Haven, Pa.*

Speaking in a general sense, perhaps no other branch of natural science is so much neglected, and hence so vaguely comprehended, as geology. This fact may be due, in a great measure, to the broad range of its meaning and the wideness of its scope, by association with the other sciences, as well as the difficulty of attaining an intelligent knowledge of its details, and from the fact that, commonly, we are more interested or anxious to learn or know more about those

certain branches of knowledge or science that can be more readily learned or utilized and afford promise of more immediate pecuniary profit or advantage.

Will it pay? is a query that seems to dominate the average American mind and explains much of the indifference with which we regard one science and the zeal or earnestness with which we pursue or study another. Hence, when the question of the mineral resources of a given locality or district arises, in very many instances, the residents and land owners are not prepared or much concerned to investigate, estimate or even conjecture what minerals of commercial or economic value may be obtained in the rock strata as they may outcrop on their properties. They are not so much interested in the possible minerals beneath the surface as they are in the matters and affairs above the surface; and this fact suggests many instances of the dense and ridiculous ignorance of this science that have come under my observation while engaged in making investigations and researches in various counties and states.

Almost anywhere or everywhere I have found people who can relate stories or traditions of supposed or reported minerals of fabulous quantity or value, and often have I been assured that coal, iron ore, gold, silver, lead, copper, zinc or other minerals are really present or to be found in certain places or localities; only to be revealed, however, to me or some one else, upon the payment of a round sum of money; and, the money not being forthcoming, the knowledge of the whereabouts of the reputed mineral discovery disappears with the man "who knew all about it;" but, who, nevertheless, went away or died in penury and poverty without even disclosing the facts to his indigent and helpless heirs.

The absurdity of very many of these tales, geological legends and traditions, is made evident and manifest to one having some practical knowledge of geology, by the fact that the reported deposit is usually said to be in some strata, mountain, hill or valley, whereof the rock exposures, geological structure or period absolutely forbid the presence of such mineral, or wherein it is not possible for such values to be present from the very character of the formations thereabouts. These various tales afford no small diversion and amusement during the somewhat irksome labor of exploring or prospecting properties, and it is wonderful what credulity and expectation in outlandish places. Some are sincere and honest; others are engaged in deliberate deception. Thus, a certain squatter and hunter, in one of the adjoining counties, related to me how he had discovered coal, iron ore and other valuable mineral deposits, among which was "a bed of steel four feet in thickness." Having some knowledge of the man's thieving propensities, for he had such a reputation, I was disposed to say that I knew where there were six feet of steel (steal); but my misgivings about the effect of such a remark restrained me from making it, as a passage at arms, at that place, would not have been to my advantage. A local preacher in Cameron county agreed to show me where he had opened four feet of coal, but when we arrived at the place and he reopened the pit, evidently sunk many years before, no coal appeared and none could have been formed in the rock period in which he had been digging. This seemed to be a clear case of geological fancy, dream or delusion, as the man was of good repute and evidently sincere.

Men of this kind, and harboring such fallacies and notions, are to be found in almost every community; such, for instance, as the young man in one of our small towns, who found (?) an excellent specimen of gold quartz while sitting near a spring under a ledge of rocks; others in our county, and doubtless in most of the other counties, who have discovered magnetic iron ore in large amount and have shown splendid samples thereof to credulous, though intelligent, merchants, lumbermen, farmers, and occasionally even a lawyer. These smart "Alees" and local prospectors, of their kind, usually know, or profess to know, the whereabouts of the ore, but fail to show it; and the deception intended or the ignorance that besets the minds of these fakirs is obvious from the fact that magnetic or red hematite iron ore, or other mineral claimed as stated, has very rarely or never been found in the rocks which are represented where these men profess to have located the said minerals, and the samples are too pure and rich for outcrop ore. Specimens of nearly every conceivable kind of rock or mineral, so called, have been sent to me for inspection and opinion, and, in nine instances out of ten, they are worthless. I have very frequently been asked to examine a certain tract or property where, as tradition has it, the Indians were wont to find lead or silver, or both, and assurances are offered me, orally, that other minerals are nearby, and there is such a medley of these things in my experience, that the vagaries attending the notions seem, oftentimes, to indicate a species of dementia, even beyond the incidental delusions that may, for a time, possess the minds of others who are misled in these matters.

Now, while the minerals are not absolutely excluded in all instances by our geological experience and knowledge, from the strata named as containing the "fine prospects" affirmed, yet the matter of discovery, as described, and the vagueness that attends the information relating thereto, constrain me to yield very little credence to any of these fables or reports, unless some additional or more definite evidence is afforded of their truth.

Good samples of magnetite or hematite may be found on the cars, passing through the town or village, and the same will serve the purpose of "truthful James" in his efforts to mislead and in his geological researches, and he carries his specimens with so much assurance, for the inspection of "gullible" people, that one can hardly question his honesty or sincerity, unless possessed of a fair knowledge of the geological conditions at the place of supposed discovery. Some fine gold or silver, or perchance, copper ore, received furtively from friends in the West, may afford the basis for a fortuitous or anamalous discovery of kindred quartz or ore not far from the city, town or village where these cranks have their abode. So it is, also, with lead, zinc, marble, etc., and the finding of a lump of iron pyrites, as bright and beautiful as gold itself, is sufficient to make a fool of the finder and perchance, many fools among his neighbors; for iron pyrites has deservedly the name of "fool's gold."

Of geological cranks there seems to be quite as many as there are of the typical religious cranks and both peradventure, of equal blessing and advantage (?) to the communities wherein they may dwell. Such there are, many of them, who can discover imaginary values in nearly every stratum or layer of rock, or even stone and in the hill, valley or mountain; and many times their geological superstition,

for such it may be called, leads them hither and thither in search of undiscovered mineral wealth of which they dream, in wild and fanciful error and delusion through a lifetime of penury or indolence. Many people intelligent and successful in business, farming, mercantile, professions, have been persuaded by such "big prospectors" to believe in the probable presence of valuable coal, ore or other mineral in places where such deposits have never been found by subsequent investigation. It is for this reason that I have adverted to the hallucinations, fallacies and absurdities of some prospectors and pretenders, who seek, either blindly or ignorantly, for mineral values and wilfully mislead people who have given the subject very meagre thought or study, when a moderate knowledge of geology would enable them in most instances to locate anything of value or readily determine, at least, whether an investigation is wise or expedient.

In my library at home are books containing thousands of pages descriptive of oil and gas, their genesis or origin, and the wells through the State, many dry and some productive. Of these two important factors of manufacture and commerce as well as of domestic convenience and comfort, doubtless, there are accessible in our public libraries many books containing elaborate discussions of the same subject and covering in the aggregate fully ten thousand pages. However, it seems to me, as one having given the matter of production and continuance of the oil and gas supply, that there is no other problem in the wide domain of practical and economic geology that is further away from entire knowledge and perfect comprehension or solution, and no other subject in this science that so much engages the close and assiduous study and attention, in the gas and oil producing states at least, as the one relating to the location, intelligently and accurately, of productive wells thereof, and ascertaining the certain trend and probable extent of the oil and gas pools or reservoirs, so-called, and the length of time in which they may be expected to afford a supply for practical use.

In our State, as well as in others,—and notably Virginia and West Virginia—we have the history of the appearance, more than a century ago, of oil or gas or both issuing in a meagre way from their subterranean source or origin; and, later, the actual finding and locating of some of the pools by tentative or experimental drilling in certain districts. But not until the very recent years were wells located and the valuable results obtained upon any definite geological deduction, rule, method or indicated facts, whereby the driller could intelligently select the site or position of his well with reasonable certainty of a favorable response to his efforts.

Hence, the investigations, formerly, were left entirely to the somewhat erratic discretion or notion of men, who, without any distinct ideas or knowledge of geology, were seized, perchance, with the vague and indefinite idea of "putting down wells" to find gas or oil, and declining the suggestions of geologists, who in a limited sense at least, had scientific views of ideas with reference to the actual location and approximate depth from the surface of these desirable products of the rocks and sands; and who, also, by degrees acquired such additional data and facts from the experimental drilling as to deduce such definite and positive conclusions that eventually became a guide to the driller, who, formerly, was wont to ridicule and dis-

parage the scientific views or aspects of the subject and make sport of the well read and carefully trained geologist, his rules, formula and science.

Without any claim or assumption of a thorough knowledge or mastery of the oil and gas question, nevertheless, I have never been impelled to venture into a theory that would define the approximate limits of the "oil and gas fields" or in any sense approve a map, at best conjectural, that would purport to circumscribe or measure the territory whence these products might be derived. The possibilities of paying wells have been so much extended and increased and the outlying and isolated oil or gas districts and the "lonely" productive wells are so far apart from the original districts as traced on the maps, long since published, that one at this late day who would assume to conjecture or figure absolutely what extent of territory is barren and what productive, may justly be termed a tyro, fakir or empiricist and places himself within the province of rational, consistent and scientific geology and acquired truth in that respect.

The theory that oil, with its associated gas, is only found in a trough or basin, while the gas alone may be located on an anticline, its slope or arch, by certain drillings, does not obtain everywhere, and the assumption that oil cannot be found on the slopes of anticlines has been nullified by recent experience and by the highest scientific authority. But the contention yet remains, with very many people, that gas alone should be sought on the slopes and arches of anticlines, as being derived from oil in the basin proper and finding its way from the oil pools to the slopes and arches through continuous rock fissures, the oil, of course, being supposedly present in or near the bottom of the trough; that is, close along the cynclinal axis and one or more miles from the point where the gas issues from the well, as drilled. In other words, the oil should be in the trough between the anticlines that have their respective crests on each side of the basis of the trough. The facts that might seem to establish a theory and distinguish it as a rule to be applied with exact certainty and verification in certain localities, or even states, may not suffice for a certain guide or rule in other localities or states.

Much remains yet to be learned and proved by years of experience and careful investigation, and the somewhat exceptional and anomalous discovery of gas and oil beyond the assumed limits of a district or basin and located by guess or random, affords no basis for a methodical drilling by a rule or assumed sequence derived, in part, from the well known and thoroughly tested fields where the trend and outline of the oil pools, at least, may be fairly understood and surveyed.

Such isolated districts as Gaines, in Tioga county, have no precedent in the discoveries of many years ago, but, however, much oil or gas may be hereafter derived from this field, the very pertinent query arises, whether along the trend of the several wells that have been productive and ceased as of those that still afford some oil, there may not be other localities northeast or southwest, that will, in some measure, greater or less, respond favorably to the drill. Therefore, we may logically expect new efforts, made in an intelligent manner, to be repaid by the revelation of new fields.

Broadly speaking, geologists have so arranged and formulated the great mass of information, otherwise not so accepted, as to be able

to afford to the driller more definite suggestions as to the locality that promises success, than the driller is willing to accord to the geologist.

In some measure, the experimental driller towards the finding of oil or gas may hereafter realize the advantages of consulting a good geologist, as in other fields of that science, such as coal, iron ore and many other minerals, concerning which the geologist alone has any clear and positive knowledge. I remark, also, that the oil and gas of Russia, Canada, Texas, California, Pennsylvania, West Virginia and many other states and nations, are mostly found in different formations; so that we are not so free to deny the presence of oil or gas in those strata that have not yet proved productive and which, while not encouraging any expensive investigation, may, nevertheless, in a local way, contain oil or gas or both; such, for instance the Findlay district, in Ohio and Indiana, wherein the Lower Silurian Limestone formations supplied for a long season and may yet furnish gas and oil, much to the surprise of geologists; these limestone rocks being variously from 12,000 to 15,000 feet geologically beneath our Devonian rocks which supply most of the oil and gas in this State. Moreover, it appears that our oil and the oil from many of the states and countries is largely of vegetable origin, while a notable exception is found in one district at least in California, where the fact that the oil will nurture larvae seems to indicate the marine animal as its main source, while, of course, California has other fields producing oil similar to our own, but, as is the case with many other states, the California oil is inferior to ours in commercial value and various products.

It is well to bear in mind the facts herein stated, and realize that it is only by the gradual process of investigation, drilling and careful study that we acquire additional knowledge and discover new fields of oil and gas for our present benefit, and much yet to be disclosed for the well being of those that succeed us and whose names as well as our own have long been "written in the book of Creation."

MR. WELD: As Chairman of the Memorial Committee, I would like to meet Mr. Hutchison and Mr. Black in the ante-room immediately to prepare our report.

The CHAIRMAN: The next item on the program is the Report of the Pomologist, Gabriel Hiester, Harrisburg, Pa. Is Mr. Hiester present?

The SECRETARY: Mr. Hiester is President of the Horticultural Association that is meeting upstairs and he will be here shortly.

The CHAIRMAN: Is there any other gentleman present that is on the program for this morning?

The SECRETARY: Mr. Chairman, Dr. Frear, the Chemist of the Board, is not able to be present but has sent in his report. The report can be read or received without reading.

The CHAIRMAN: What is the pleasure of the Board in reference to this report?

MR. HUTCHISON: Mr. Chairman, I move the report be read by the Secretary.

The motion was seconded, put and agreed to.

The report of the Chemist was then read by the Secretary, as follows:

THE PEAT BEDS OF NORTHERN PENNSYLVANIA.

By DR. WM. FREAR, *Chemist*.

Mr. President and Gentlemen of the State Board of Agriculture:—Pennsylvania with her constant increase in population places upon the farmer the responsibility for providing a steadily increasing food supply, in which variety as well as quantity must be regarded as important factors. As far as conditions of production and transportation will allow, these supplies should be produced within our own borders. In view of the growing food demand, it is of great importance to the continued prosperity of the State as a whole that not only the methods of handling her present cultivated areas be improved, but also that the great areas within her borders that have not yet been brought under subjection and planted with food crops, be carefully studied to the end that they may be used for such purpose wherever their nature is such that they may be used for such purpose contribute to these supplies. The recent work by the State Experiment Station in co-operation with the United States Bureau of Soils in the study of the lands adaptable to the production of the apple and peach represents one promising effort of this kind. There are, however, numerous other promising subjects of study having the same end in view. Among these the development and use of the peat beds of the State are worthy of serious consideration and, judging from the growing number of applications made to the Experiment Station for analysis of these beds, public interest in them is growing.

There is unfortunately no survey of the State such as enables us to give at this time the total areas occupied by such deposits. In the various surveys of the State, these peat bed areas have been grouped with bottom lands in such a manner that the areas occupied by the latter and the peat beds respectively cannot be determined from the data published. It has been thoroughly estimated, however, that as a whole these beds cover not less than 75 square miles. All over the regions of the State covered by the glacial drift there are numerous lakelets filled from the drainage basins formed by surrounding steep hillsides, the entry of the water into the lakes often being by springs discharging upward into their bodies the sub-surface flow contributed by the higher land surrounding. These lakes have commonly been formed by dams of glacial drift deposited in the ravines of which the lakes form heads and the lakes discharge the excess of the water they receive through small streams flowing sluggishly over the tops of these dams.

Some of these lakes are shallow, because they were not deep to start with or because they have been filled with wash from the adjacent hillsides; others are still deep bodies of cold water. Be

cause of the obstructions they alike possess both the shallow and deep lakes are marked, however, by only a slight current movement. Under these conditions many of them have gradually filled in with vegetation. The course of development of this vegetation consisted first in the formation of a growth of algae and related organisms over the water surface. The vegetable covering gradually thickened and presently came to support other growths, more especially those of the mosses. The weight of these later layers caused the undermost gradually to sink. This sinking often took place most rapidly near the shores of the lakes. As this succession of vegetation went on, the thickening layer of decomposing plants and the mineral wash from the surrounding uplands that is from time to time received in quantities varying very greatly according to the surroundings, in many cases, particularly of the shallower lakes, completely filled their depressions with a mass of vegetable matter; in other cases the vegetable layer became not only continuous but sufficiently coherent to support the weight of men and even of the larger domestic animals, although underneath the mass remained great depths of lake water. Through and under these vegetable formations the excess of lake water continues to seep slowly into the small streams that sluggishly work their way through the outlets earlier described. The character of the surface vegetation of these vegetable lands has changed from time to time, and today many support thick growth of flags, sedges, and bushes like that of the cranberry, but very rarely the heavier growths of trees. In a great many cases, the shores of the lake are fringed with bushes which have not, however, pushed out from the shores on to the bogs or peat beds just described.

These soils, together with those of swamp lands, are commonly classified as *cumulose* soils. In many particulars they differ from the other soil classes composed chiefly of mineral materials, their adaptation to crops is very much more limited than in the case of mineral lands, and the methods of their treatment also are peculiar. They have, however, marked fitness, under favoring conditions, for certain important crops, and contribute, moreover, raw materials of considerable value to a number of growing industries. In view of the increasing interest in the composition of these beds shown by the Station's correspondence, of the greater experience now available to guide their cultivation, and of the development of technical uses for their materials, I have thought it fitting to speak briefly upon some points relating to the preparation and cultivation of these cumulose soils and also concerning a few of their technical uses for certain of their products.

As a fundamental fact limiting and at the same time suggesting their adaptations, it should be recognized that these soils are formed almost entirely, or at all events chiefly, of vegetable matter which has decayed without the full access of air and that its raw materials have, for the most part, consisted of plants rather deficient in those mineral materials to deficiencies in which our ordinary field crops are particularly sensitive; and that furthermore, for a long period of time, these decaying plants have been leached by slowly trickling bodies of water so that such of their mineral materials as became soluble during the decay, were likely to be removed by the leaching process. Because of the small degree in which air had access to them during their decay, these vegetable masses suffered a putrefactive

decomposition, rather than that gentle oxidation most favorable to the conversion of plant remains into food suitable for succeeding plant organisms. The putrefactive conditions have gone on very slowly and while they have resulted in the loss of carbonaceous materials and also of some nitrogen, they have left residues rich in the latter element. Owing to the exclusion of air, the mineral materials of the decaying plants have been reduced rather than oxidized. The iron they contain, often in considerable quantities, has been either largely removed from them to lower strata, or has been held in the form of iron pyrites. The organic matters which remain are largely acid in their character, and, while little is known of the individual substances forming the organic complex in these soils, experience has amply proven that they are not in condition to favor the growth of ordinary crops, but rather to injure plants of such species.

As a rule the upper layers of these cumulose soils are dark, sometimes almost black in color, while the lower layers, less freely exposed to the air, are brown in tint. The upper layers are often covered by mossy growths, commonly those of the *Sphagnum* species, but the main body of the mass exhibits only faint traces of the organisms from which it was derived, except in the case of occasional large woody roots which found their way among the other vegetation. In some cases the material is of a dry, semi-resinous, or pitch-like consistence.

From the agricultural point of view the most interesting quality of these soils is their richness in nitrogen. This element is not present, it is true, in such condition that it is ready without important changes to contribute to the nourishment of ordinary crops; but the changes which must be brought about are such as can in many cases be quite readily accomplished. In lime, phosphoric acid, and potash, particularly the latter, the cumulose soils are particularly deficient, and it is, therefore, a condition to their successful use for agricultural purposes that liberate quantities of these less expensive fertilizer materials be supplied. In a few instances, considerable quantities of calcareous matter have been contributed to the cumulose beds in the wash from the neighboring hillsides; but the latter themselves throughout the glacial regions are not marked by any special abundance of lime compounds. For this reason, the wash, even when it forms a very considerable fraction of the cumulose soil, rarely contains enough soluble lime to change materially the character of these soils so far as concerns the supply of lime necessary for their conversion into productive lands. It is, as I have said, to their nitrogen that their agricultural value is due. This element, present to the extent of but .05 per cent. in heavy clay subsoils, averaging about .15 per cent. in good arable lands, and rarely exceeding .25 per cent. in old meadows, amounts above 1 per cent. in these cumulose soils and sometimes reaches two to three times that amount or even more. Studies made at the Station of the conditions in which this nitrogen exists, show that the various beds so far examined differ quite materially in their proportions of what is termed active humus; that is, of organic material capable of solution in dilute alkali. In ordinary lands where the active humus is abundant it is believed that the plant remains constituting the humus are in the highest degree available for the support of succeeding crops. In the cumulose soils most of the organic material is inactive, so that the nitrogen is especially resistant to the natural processes tending to make their

nitrogen available. In other cases, however, the proportion of active humus is quite considerable, and included therein may be found an important fraction of the nitrogen content of these soils.

Several points concerning certain of the physical properties in which the cumulose soils differ especially from the soils of other classes, may be noted in this connection. Respecting their heat relations, it should be observed that the soil temperatures are governed by the comparatively large amounts of water these soils contain, both when in their normal state and when best prepared for cropping. Schübler showed that, doubtless owing to their dark color as the principal influential property, garden mould and humus soils attain, when dry, higher temperatures upon exposure to the sun than do other soils. This is because it takes less heat to raise the temperature of humus than it does to increase those of clays, sand, etc. For Ulrich has shown that the quantity of heat required to increase by one degree the temperature of dry humus is about one-half that necessary to cause a like elevation of temperature in equal weights of clay, chalk, or sand. The power of these organic soils to transmit or conduct heat from one point to another is also much less than that possessed by the principal substances in mineral soils, as has long been known and recently very carefully proven by Patten.* All these data refer, however, to dry cumulose soils, and are of greater scientific than practical value because, by reason both of the location of these soils, their relation of bodies of water, their usually low lying position with respect to surrounding lands, and also because of their water requirements under cultivation, the cumulose soils are, in practice, dealt with only in the moist condition. As a matter of fact, these soils are cold, thaw out late, have a very short growing season, and are especially subject to late spring and early fall frosts; their common location near the foot of steep hillsides, renders them particularly open to the influence on quiet nights of cold air drainage, which intensifies conditions otherwise favorable to frosts.

The water relations of these soils are especially important. They have, in the first place, a very large water-holding capacity; that is, power to hold water without dripping. Those layers which are open and spongy, particularly those composed chiefly of mosses little decomposed, have an especially high water capacity amounting in some instances to upwards of six times the weight of the soil, or four-fifths of its dry volume. As the organic materials break down, however, they become less spongy, with a corresponding decrease in their water capacity, which nevertheless amounts in many cases from one hundred and thirty to one hundred and sixty parts by weight of the soil or from fifty-five to sixty-seven parts by volume. Their resistance also to the passage of water from one point to another in either a horizontal or a vertical direction, differed with the degree to which they have been decomposed, the movement being much more free and rapid in the more porous, little decomposed soil. When the compact, decomposed cumulose soil is broken up by cultivation instruments, its capillarity, that is its power to lift water through its pores, is distinctly increased. Another fact of special importance is that, once these soils are dry, they take up water very slowly, particularly when they are reduced to a fine dust, which is readily produced by the too frequent treatment of the surface of these soils with fine cultivating tools. Because of the slowness with which they recover from a

drought and of the fact that they give up their water with considerable reluctance to growing plants, it is particularly important that the cultivation and management of the water relations in these soils be very carefully and systematically controlled.

Another of their physical properties requires mention because of its vital importance in limiting the range of production of these soils,—that is that they exhibit a very great change in volume as they dry or become wet and especially as they freeze and thaw. As a result biennial plants or others that occupy land through the winter are especially likely to be heaved out; hence, these lands are not usually suitable for the production of winter grain crops or for legumes having more than a single period of growth.

To prepare these soils for cropping, it is necessary to get out the excess of moisture, to admit the air with its warming and oxidizing power, to free the soil from substances injurious to crops, and to apply such amendments as will promote the availability of the nitrogen held in an inert condition by these soils and to add such fertilizing substances as they lack.

The cost of preparation of these lands by drainage and by the application of amendments and fertilizers is too great, in most instances, to render economical the use of these lands for crops that are now produced by extensive methods of farming. Where, however, the transportation facilities, nearness to market, and labor conditions make possible the growing intensively of onions or celery, it is well worth while considering whether or not the peat beds in such localities have drainage relations as will make their drainage possible without a too great expenditure, so that they may be fitted for the production of these crops.

It is not my purpose in this brief paper to describe fully the several methods which have been found useful in preparing such lands for cultivation. Several of the more important principles which govern will, however, be suggested. The first step is drainage and the method most generally followed as to drain by ditching with or without the use of a subordinate system of tile drains. The water relations of these soils suggest and the extensive experience of German farmers in the management of the moor lands which form so important a portion of the area of northern Germany, have proven that the drainage of cumulose soils require plans different from those required in the case of mineral soils. In general, the water-table should not be more than twenty to twenty-eight inches below the surface and, where tile drains are used, the lateral ditches may be spaced so as to have an interval of sixty or ninety feet; and it is particularly important that the ditches be provided with dams, so that the drainage water may be dammed back to make it possible to hold the water in the soil during dry seasons. Irrigation systems also have been found especially advantageous for these lands in such seasons. Many of the peat beds of Pennsylvania are so situated that their drainage can be accomplished quite simply. There are others however, whose water level is determined by that of a large open body of water near whose outlet the peat bed is located. In the latter case they do not promise convenient control of the water relations, except where the peat beds lie at a level considerably above that of the lake.

As the water is drained away, the air enters these lands and begins very promptly their improvement by its oxidation process. A year

or more is, however, often required to promote sufficiently the conversion of these soils by oxidation to fit them for cropping.

The process of oxidation is not in all cases productive of entirely beneficial changes in the land. This is particularly the case where the latter contains, in considerable quantities, iron pyrites, bisulphate of iron, for when pyrites are brought into contact with air, they oxidize and form sulphuric acid and oxyhydrates of iron. In lands still holding sulphuric acid, it works marked injury to crops started upon the soil and the removal of this acid by drainage is very slow. It will be recalled that these lands hold relatively small amounts of mineral matter such as might combine with the sulphuric acid to form harmless compounds.

The general method of remedying this defect is the addition of lime or of carbonate of lime. The range of recorded experience in the application of lime to these soils is too small to warrant the formulation of any rules as to the quantities in which they should be applied; in general, however, the dressings are relatively abundant. The lime not only neutralizes the sulphuric acid and decomposes any sulphate present in harmful compounds, but, also like the air, changes the character and proportions of the lower organisms living in these soils and working over their materials. Some cultivators have found that the ashes left by the burning of the weeds and other waste growths upon the surface of the land, yielded sufficient alkaline material to make possible the growing of satisfactory crops on peat beds without the use of lime or of similar alkaline amendment during the first year. In such cases, the burning was conducted in the early spring while the soil was sufficiently wet to prevent the fire from extending downward into the peat bed and thus destroying it and liberating a large amount of available nitrogen.

It has already been pointed out that the plants from whose decay these peat beds are formed, are usually poor in phosphoric acid and potash, particularly the latter. It is readily understood, therefore, that those who have attempted to crop these cumulous soils after treating them with lime alone have often obtained unsatisfactory yields. Economic returns should not be expected, except where liberal dressings of rock and potash, rich in the latter element, are employed. The fertilizers need not, however, be expensive in proportion to their concentration in plant food for the reason that nitrogen, by far the most expensive plant food, is little if at all required on these lands.

No attempt will be made to describe in this place the detailed methods useful in the culture of onions and celery upon these lands. Various experiment stations have published numerous bulletins treating more or less directly upon these subjects and those interested will do well to obtain the Farmers' Bulletins and other publications treating of them.

There is another way in which muck is made useful on a farm which deserves brief consideration at this point. It has already been noted that the upper, looser layers of the peat are very spongy and can, therefore, hold larger quantities of liquid without dripping, and it has been pointed out also that they contain important amounts of nitrogen which though not available in their original state, can, if the proper fermentations be set up, be converted into plant food. These qualities have led many farmers to expend the labor necessary

to dig out piles of the muck allow them to stand where they can drain and undergo the changes brought through the winter's freezing and the summer's heating, and have then applied the material as a top dressing or as a material to be mixed with the soil. The results of these operations have not indicated that the treatments of drainage, freezing, and oxidation have been sufficiently effective to make the bed thus prepared a highly useful soil constituent. When, however, this porous material is put into the drops of a stable, or partly mixed with the rotting manure heap in the barnyard, it becomes impregnated with the stable or barnyard liquor and sets up a much more rapid fermentation. I am unable to recite chemical evidences showing the substances into which the nitrogenous materials of the peat are changed by the fermentations set up under these conditions, nor to give the results of exact vegetation experiments with the fermented materials, but the general judgment is that after such fermentation the peat contributes a very considerable proportion of nitrogen to the plant food supply of the soil upon which it is used as a dressing. It is, however, of great value as a bedding material. The sphagnum moss gathered by cheap labor in German swamps and imported into our seaboard cities under the name of "German moss," has been quite largely used for bedding horses in city stables. It shows a very large capacity to absorb stable liquor, does not undergo disagreeable fermentations, and has considerable durability. It does not, however, keep the animals in so clean a condition as good rye or wheat straw. Certain of its constituents seem to retard the amoniacal fermentation. On the other hand, more highly decomposed muck turns, when used in the drops, into a heavy black mud, hard to handle, and not most conducive to stable cleanliness. In my introductory words I referred to the fact that these peat bed materials are coming to increasing technical use. At the present writing, it is possible to make only a brief reference to some of these uses. The moss, picked and dried, is being employed as a packing material in the place of excelsior, as a filler for mattresses, and also as a raw material for paper manufacture. Another use to which the more compact materials of peat beds are being put is that of a fuel. It is well known that, for centuries, the Irish peasant has warmed his cottage by use of the heavy turf or *sods* of peat cut from some nearby bog. The present experiments have the object of putting this fuel into more compact, convenient, and durable form for transport and consumption, and very interesting results have been obtained by the making of briquettes of peat, with or without the use of combustible bindings. Most of the acetic acid used in chemical manufacturing operations is now produced by the distillation of wood whose chief constituent is cellulose. Distillation methods have also been applied to peat with more or less promising results.

The last of these technical uses to which I would now refer is the use of dry peat in the manufacture of commercial fertilizers. For this purpose thoroughly decomposed peat is used. It is prepared by drainage, drying, and granulation by a milling process. Thus prepared it contains in some cases as much as 3 per cent. of nitrogen. Its use in fertilizers might, in view of the fact that the nitrogen as it is in peat is practically useless to plants, be regarded as undoubtedly fraudulent in so far as the nitrogen contained in the peat enters into the sum total which the fertilizer guaranty requires

shall be present in the mixed fertilizer. In other words, the case is not simply that of an inert filler having no fertilizer constituents which would appear upon the usual methods of analysis and which is employed solely as a make-weight in the manufacture of low grade fertilizers. The fertilizer manufacturers claim, however, that the use of this or some other organic material in the base goods from which the various fertilizer mixtures are made by the addition of one or more of the fertilizer salts is desirable, because it serves as a "conditioner," that is, a material which keeps the goods in excellent drilling condition even when they have been exposed in storage to extremes of dampness or dryness; whereas, without some such material the fertilizer tends either to become moist if stored in damp places, or to dry and harden into lumps if stored in places too dry. No farmer who has applied fertilizer by means of a drill or by means of a broadcaster, will question the importance of a good physical condition in a fertilizer, but I am confident that, on the other hand, he will not be satisfied to pay for peat nitrogen at nitrate, ammonia, or tankage nitrogen prices, unless he be satisfied that a good physical condition cannot be secured at a less price. It has certainly not been demonstrated that the use of this material is necessary to the maintenance of a good drilling condition in a fertilizer. There are unfortunately no data available whereby the quantity of nitrogen contributed by peat and similar materials can be ascertained from the examination of a finished fertilizer. Indeed, there is yet lacking an entirely satisfactory test of its presence in any quantity. In the existing condition of knowledge we may, however, gain some slight satisfaction from the facts that peat is commonly introduced into fertilizer base by the wet mixing process and that, as Professor Haskins, of the Massachusetts Experiment Station has shown, peat nitrogen after exposure to the heat and acid of the wet mixing process becomes more highly soluble and has shown itself by vegetation tests conducted in wire baskets in a very considerable measure more available to plants than when in its original raw state. The Pennsylvania Agricultural Experiment Station is at the present, under the writer's direction, conducting tests upon the effect of wet mixing on inert nitrogenous substances, including peat, with the hope of adding to our present knowledge upon this subject.

The CHAIRMAN: You have heard the Report of the Chemist. What action will the Board take on it?

MR. GLOVER: I move the report be received and published in the journal of the proceedings of the Board.

The motion was seconded, put and agreed to.

The CHAIRMAN: Is there any other gentleman present that is on the program for this morning?

Has any Committee a report to make?

The SECRETARY: Mr. Chairman, in the absence of any more of the Specialists of the Board, I think perhaps we had better take up the last item on the program, the discussion of Tile Drainage by

T. E. Martin. Mr. Martin asked me to secure for him a blackboard that has not arrived so far as I am able to see. Is Mr. Martin present? He does not appear to be at this time.

The CHAIRMAN: Is there any other gentleman present that has anything to say to fill in until he arrives? We don't want to have a Quaker meeting.

MR. RICHARD ATWATER: Mr. Chairman, I am not a member, but may I speak a moment?

The CHAIRMAN: Certainly, sir.

MR. ATWATER: The principal matter that brought me to this meeting was to look into the use of basic slag. Our lands in the southeastern part of the State need phosphorus and I have no doubt they do all over the State. In the last few years the process of making steel in Pennsylvania has changed, as you probably all know, from the Bessemer process to the open hearth process or the basic process by which the phosphorus in the iron ore is eliminated by mixing with lime and gas and carried out in the slag as phosphate of lime. We are paying high prices for phosphoric rocks from different parts of the South, Florida and South Carolina and importing basic slag from Europe made by the steel process as improved there. I would like to know whether any use is being made of the phosphoric acid drawn out of the open hearth furnaces at Harrisburg and Bethlehem and Lebanon and other places. It seems to me that it is one of the most important sources of fertilizer for the farmers of Pennsylvania that I know of.

I hoped to find Dr. Frear here this morning as I think he will be able to tell me what I want to learn.

MR. BRONG: Mr. Chairman, basic slag is a material, as the gentleman stated, derived from iron. The phosphoric acid that it contains is not water soluble to any great extent. It is, however, available as plant food in the soil. We have used it for eight or ten years. We find it profitable. We can buy it cheaper than we can buy acid phosphate. We believe that acid phosphate used continually has a tendency to discourage the growth of clover by souring the soil, and therefore we prefer very much the use of this material. We use it almost exclusively on our farm.

MR. ATWATER: That is what I hear from the people. I speak on the basis of buying imported basic slag. You get your lime free, about thirty-five to forty per cent. in it, and that is all the advantage you have. But here we have it at our doors without bringing across the waters.

A Member: I would like to ask the price of acid phosphate in Baltimore last year.

A Member: It was, I think, ten dollars for fourteen per cent. It came to the other end of Crawford county at much less, well about thirteen dollars and fifty-five cents for a ton of sixteen per cent. My idea was that the unit of percentage of phosphoric acid in basic slag would come much higher than that, if you have the per cent. and proportion of phosphoric acid.

MR. BRONG: The acid phosphate costs at retail—of course, I do not buy it at retail—but at retail the acid phosphate costs about one dollar a per cent.; that is, fourteen dollars for fourteen per cent. phosphorus; and basic slag, also at retail—I don't buy it at retail—we can buy for eighteen dollars a ton. The basic slag contains over nineteen per cent. phosphatic acid.

A Member: Practically the same price.

MR. BRONG: They consider this per cent. of acid the unit. You pay the price per cent.

MR. ATWATER: The advantage at the present time in buying imported is that you get your lime free.

The CHAIRMAN: The next will be the Report of the Sanitarian of the Board, Dr. W. H. Banks, Mifflintown, Pa. Is Dr. Banks here? He does not appear to be present so we will go on with the next item. The next item on the program is the Report of the Microscopist and Hygienist, Prof. J. W. Kellogg, Harrisburg, Pa.

Prof. Kellogg then read his report as follows:

REPORT OF THE MICROSCOPIST AND HYGIENIST

By PROF. JAMES W. KELLOGG.

A report of the work accomplished during the year must necessarily be confined more to microscopical examinations than to that which might possibly be designated to the duties of a hygienist, or the work which has to do with sanitary science and the preservation of health. Your specialist has only been able to devote study to microscopical work in connection with the examination of feeding stuffs made by the Bureau of Chemistry of the Department of Agriculture, whose duty it is to examine these commodities for their purity of composition. During the past year, we have been busily engaged in this line of work and are able to report that the samples examined were found to be as a whole greatly improved over those examined during the previous year.

The use of the microscope in investigations of this kind and in studying nature is one of the most interesting branches of science. The value of this instrument cannot be estimated, and the discoveries made by its use are too numerous and too wonderful to endeavor to describe here. The microscope has helped men of science to unlock the secret of nature, to look into another world, the microscopical world so to speak, and to discover new forms of life and small particles of matter which were never dreamed of before this valuable instrument was perfected and as widely used as it is today. All through the centuries men have unlocked nature's secrets one after another, first, by a very crude instrument and later by improved

forms, until at the present time, the microscope is used in practically all branches of scientific research, and in the business of the commercial world.

It was known by the Greek and Roman Philosophers before the time of Christ, that globes of crystal or lenses would focus the sun's rays to a single point. Seneca states that "letters though small and indistinct are seen enlarged and more distinct through a globe of glass filled with water." The ancient students, however, do not appear to have made use of this phenomenon as an aid to vision, as in the thirteenth century, medical writers seemed to be of the opinion that it was impossible to cure short-sightedness.

The first distinct advances in microscopy were made by the Arabian physician, Alhazen, in the eleventh century. Near the end of the thirteenth century, we learn that lenses were first used as a help to defective vision, for we are told that Salvino Armati, a Florentine, first invented spectacles. At about the end of the sixteenth century, lenses were used as microscopes for the examination of objects too minute to be studied with the unaided eye. These lenses were, of course, very crude affairs and were only used singly. The microscopes which are in use today are known as compound microscopes and are made up of several lenses capable of magnifying an object several hundred times. The first instrument of this kind was invented about 1590, and Galileo perfected one in 1610. Since this period, every year has seen new improvements, and no up-to-date and well equipped laboratory is complete without a microscope. It has only been in recent years that this instrument has been made use of in the analysis of foods and feeding stuffs, and Pennsylvania was one of the first states to take up this line of investigation.

When the inspection of feeding stuffs was first commenced in our State, it would have been impossible to learn the true character of these products, if microscopical work had not been done. The analysis of a feeding stuff is of course of great importance, but it is also important that the source of protein, fat and carbohydrates are found, and by a thorough examination of the feeding stuffs, we are able to determine the source and nature of the ingredients. It would seem to those unacquainted with the work that it would be difficult to determine the composition of a mixed feed which has been compounded of several ingredients, covered with molasses, dried and finely ground, but with the aid of a microscope, we are able to magnify each little particle or tissue in any feed to 400 times its actual size if necessary, and as occasion demands, and to tell just what cereal or by-products are used in the mixture.

Every cereal has a peculiar cell structure different from that of other cereals, and the starches of the many grains differ in their size and shape, and it is as easy for an expert to learn to know these different grades of wheat. There are twenty different kinds of starches which are in this way easily identified by the size and form of their grains.

The structure of the cell walls of a kernel of wheat grown this year would be the same as that of one grown in Egypt two thousand years ago, and can be easily distinguished from the cell structure of rye, barely or oats. This may be illustrated by the fact that the side walls of the cell in the seed coat of a kernel of wheat looks under the microscope like a string of beads, while those found in the

barely are smooth edged and sinuous, and the cell walls of other cereals are different from these. The starches of the wheat are round and flat, while those of the potato are three or four times as large and shaped like an oyster shell. The structure of the cell walls of the corn cob, rice hulls, peanut shucks and the weed seeds are very characteristic and markedly different from each other when magnified about four hundred times, and are easily identified by the practiced eye.

A few years ago, a large number of feeding stuffs were sold in Pennsylvania which contained rice hulls in a finely ground condition, ranging from ten to twenty-five per cent. Other by-products were used which caused the protein and fat to meet the guarantees, but, by the aid of the microscope this form of adulteration was detected, and as a result during the year just closed, this material was not found to be present in any feeding stuffs sold in our State. By our thus being able to tell of just what the products are composed which are offered for sale as a food for our citizens, or as a feed for their stock, we are able to prevent fraud and deception and to keep down the sale of such articles which are not worthy of being produced or sold.

The stalks, tissues and fibers of plants, the cell structure of woods and barks, hair, wool, fruits and their seeds and hundreds of other products of the vegetable and animal world have special characteristics of structure known to the trained microscopist. By reason, therefore, of his special knowledge, he is called upon to tell whether or not a product sold as wheat middlings contains 26 per cent. of ground corn cobs, if the pepper which he is using contains vegetable ivory, cocoa shells or some inferior bean, and whether or not the many spices are as pure as advertised. He is asked to tell us the composition of paper and to state the proportion of linen rag or wood pulp used therein. By a knowledge of the structure of the vegetable and animal fibers, the composition of fabrics can readily be told. Thus, it will be seen that the microscopical investigations which have been made and which are continually going on are of great value, and this work in conjunction with chemical analysis has made it possible to keep the food products sold in our Commonwealth up to a high standard.

The work of a hygienist should be devoted to that branch of sanitary science which has to do with the keeping of the communities in which we live in a sanitary and healthful condition. Work of this nature covers a wide range of subjects, and it is unnecessary to state its value. For several years large and small cities have devoted a great deal of time and money to this line of work, and the work done by our present State Department of Health is well known throughout the land. When investigations are made as to the sanitary conditions of some places of abode, it is almost amazing to learn how little attention is paid to this work. Laws have been passed in nearly all the states of our country, regulating the sale of food products. In many of our cities we have milk inspection and of course food inspection, but very few cities or communities have what might be called sanitary inspection, which, to my mind, is as important and possibly more important than the analysis or examination of foods. This might be illustrated by conditions which can in many instances be verified by visiting a restaurant to obtain

a meal. The food served there might be of the best quality and may have been in a cleanly condition, but, on the other hand, it often happens that the sanitary conditions of the kitchen and those serving us are such that would make the spread of disease or sickness possible. I personally have been an observer of these conditions, possibly noticing them more than some, by reason of being very much interested in this line of work.

I have visited cafes, restaurants and places where food is sold and have noticed that the sanitary conditions and the methods of handling food were not as they should be. Many illustrations might be given but these conditions are too well known to the careful observer to bear repetition here.

The State of North Dakota enacted a law of 1909, known as the Sanitary Inspection Law, which, it seems to me, is one of the most important laws which has to do with the preserving of the public health which has been passed for some time in any state. This act provides for the sanitation of bakeries, canneries, packing houses, slaughter houses, dairies, creameries, and every place and vehicle in which food for men is placed for transportation or sold. It also provides for the proper and cleanly condition of any dispensary, hotel or eating house where food is sold. It makes it possible for officers in enforcing this law to visit all such places and see that the plumbing and drainage are proper and that the places are kept clean, properly lighted, etc. It also provides for protection from flies, dust and dirt, and that operatives, employes, clerks and any persons who handle foods in any way, shall be cleanly, and to be free from any disease, a number of which are enumerated.

I have been told by the official who has this law in charge that it has worked remarkably well and has been the result of causing several ice cream dispensaries and small restaurants to practically close down until the sanitary conditions were such as to warrant patronage. The Health Department of our State would of course control this matter to some extent, but I thoroughly believe we should have a strictly sanitary law which would correct these evils and prevent such unsanitary conditions as are too often observed in places where food for human consumption is offered for sale.

The CHAIRMAN: You have heard the report? What action will you take upon it?

MR. GLOVER: Mr. Chairman, I move the report be received and published in the journal of our proceedings.

The motion was seconded, put and agreed to.

The SECRETARY: Mr. Chairman, the Poomologist of the Board, Mr. Hiester, has sent his report down with the statement that he is kept so busy in the room above that probably he will not be able to be here. Now this report is at the disposition of the Board. It can be read or it can be received without being read.

The CHAIRMAN: What is the pleasure of the Board?

The SECRETARY: Mr. Martin does not seem to be in and possibly it may be as well to have this report read so that we will have something to be thinking about.

MR. ESCHBACH: I move, Mr. Chairman, that the report be read.

The motion was seconded, put and agreed to.

The CHAIRMAN: By whom is it to be read?

The SECRETARY: It is a pen written report. I will try to read it.

The CHAIRMAN: The Secretary will read the report.

The report of the Pomologist was then read by the Secretary as follows:

REPORT OF THE POMOLOGIST

By **GABRIEL HIESTER**, *Harrisburg, Pa.*

We are at last making some progress in the science of growing fruit. The orchard experiments that have been running four years under the supervision of Prof. Stewart of the State Experiment Station are beginning to show results. For instance, it has been found that nitrogen applied in the form of nitrate of soda after the fruit has formed, in June, increases the size of the fruit, as well as the growth of the tree, but at the same time it reduces the color of red apples. This loss of color in Prof. Stewart's opinion is caused by delayed ripening. Again, it has been found by practical fruit growers that fungicidal sprays applied under proper weather conditions will cause the foliage to remain fresh and green until nipped by the frost, and when the leaves are kept in a healthy condition late in the fall fruit is delayed in ripening. This may mean a great deal to the orchardists of southern Pennsylvania, especially to the region known as the York Imperial belt, namely, that section of the Blue Ridge extending from the Maryland line to the upper end of Dauphin county.

The Baldwin apple is generally recognized as the best business apple; it is the standard by which other varieties are measured—as to vigor of tree and hardiness, quality of fruit and the price it will bring in the general market. There are large areas of ideal Baldwin soil in this York Imperial belt, and many thousand Baldwin trees of bearing age. The variety, however, has one serious defect, owing to climatic conditions the fruit drops early in the fall, and those remaining on the trees do not keep well. For this reason several less desirable kinds, which will hang on the tree are being recommended for planting in this district.

If, by the judicious use of nitrogen as a fertilizer and Bordeaux or some other fungicide as a summer spray, we can hold the fruit of this desirable variety on the tree until the first week of October, the Baldwin trees already growing in the orchards will be made profitable. More Baldwin trees will be planted and King and Spy will be added to the list—for with very slight variation of soil conditions the two latter will succeed wherever Baldwin does. We know that York Imperial, Grimes' Golden and Staymans' Winesap develop

their highest qualities in this region. If we can add Baldwin, Spy and King we will have six splendid varieties to select from. It seems to me the York Imperial belt should very soon develop into the most famous apple orchard in the world.

If the future observations of Prof. Stewart shall confirm the impression already formed, namely, that nitrogen properly applied as a fertilizer will delay the ripening of apples, and if that with the aid of a proper fungicide as a summer spray, will keep them on the tree in southern Pennsylvania until mid October, by which time the sun will have painted them the proper color, this one discovery will be worth a hundredfold more than the entire cost of the experiment.

Another fact has been brought out by these experiments: In the older orchards, especially those which had not in recent years been well cared for, nearly all the feeding roots were found to be outside the spread of the branches. Many of them extending forty feet and more from the trunk. It will be well for the owners of old orchards to bear this in mind and in their efforts to bring the trees back to profitable bearing, place their fertilizers where they will do the most good. When placed near the trunk they are of very little value, when placed under the outside branches they are partially available, but when scattered between the rows outside the branches the trees get the full benefit of them.

In my last report I expressed a hope that in the near future we might have an investigation started to ascertain the effect of different types of soil and subsoil on the several varieties of fruit, for the purpose of enabling us to plant the right tree in the right place. I am glad to be able to announce that in response to the urgent request of Dr. Hunt, Director of our Experiment Station, the Department at Washington detailed Mr. H. J. Wilder of the Bureau of Soils to work in Pennsylvania. The Department loaned Mr. Wilder to our Experiment Station for one year, and he has been at work in this State all summer. Mr. Wilder has made a good start. He secured and tabulated much useful information; he has done well for the time spent, but his work is only begun. Our people are only beginning to appreciate the value of it, therefore it seems to me that it would be a calamity to have this work stopped at the close of the year.

I would suggest that at the proper time this Board pass a strong resolution urging the Department at Washington to continue his leave of absence, and another asking our Experiment Station to continue this work, and also to continue the orchard experiments so ably conducted by Prof. Stewart; in both of these lines we have made a decided advance.

Experiments with various fungicides and insecticides as summer sprays have been conducted by Prof. Stewart at our Experiment Station; by our Economic Zoologist; by the National Department at Washington and by the Experiment Stations of the several states. Nothing has yet been found that is in all respects and under all conditions better than Bordeaux and an Arsenate. It seems that under certain weather conditions they will all do more or less injury. It is up to our scientific men now to tell us under what weather conditions we should not spray with anything, and under what weather conditions we may use the several sprays which they have found effective.

The use of self-boiled lime-sulphur for the control of brown rot in the peach is gaining in popularity, and we hope that before another year has passed, we may have a formula for making it that will be certain in its effect on the fungus, and at the same time do no injury to the foliage.

The most hopeful sign of the times is the interest the young men are taking in horticulture as is shown by the number of students in the regular four years course in horticulture at State College, in the two years course and in the twelve weeks course, and the young farmers who attend the lectures on horticulture during farmers' week. These young men are not only learning how to grow fruit, they are carefully studying the art of grading and packing, and already are sending to the general market box apples and barrel apples, which for skillful, honest work will compare favorably with those from the famous orchards of the west. These young men are doing much toward establishing a reputation for Pennsylvania fruit. We all recognize the fact that the greatest need of the fruit industry in Pennsylvania is men properly trained for the work, and this need is being gradually supplied, with a number of Horticultural graduates going out from State College each year and hundreds of working farmers going to the college each year for a week's lecture course, with the Farmers' Institute bringing lecturers to their very doors, to tell them why they should do certain things, and the demonstrators of the State Department following up the institute to show them how to do it, the men are rapidly being trained for the work, and we are developing a class of fruit men in Pennsylvania equal to any that can be found in the most progressive fruit district of the country.

The CHAIRMAN: You have heard the report. What action will you take in regard to it?

MR. HUTCHISON: Mr. Chairman, I move the report be received and published in the journal of our proceedings.

MR. KERRICK: Mr. Chairman, I would request the Committee on Resolutions, Messrs. J. A. Herr, Shaffer, Perham and Shoemaker, to meet with me in the anteroom immediately.

MR. HUTCHISON: Mr. Chairman, before that committee retires I move that that portion of Mr. Heister's report which relates to the passing of these two resolutions in regard to having Mr. Wilder, now detailed by the Department at Washington and who is now doing such excellent work at State College, continue his work; also that portion of the report regarding the continuation of the experiments by Prof. Stewart; that that be referred to the committee for action and the preparation of the resolutions as suggested.

The motion was seconded, put and agreed to.

The CHAIRMAN: Is the Memorial Committee ready to report?

MR. WELD: We are, Mr. Chairman.

The report of the Memorial Committee was then presented by the Chairman, Mr. Weld, as follows:

REPORT OF THE MEMORIAL COMMITTEE

It is with a sense of sincere regret that your Committee at this time record the death of our fellow member and co-worker from Montgomery county, Honorable Jason Sexton, and while we know that he has passed to a better and brighter land, our hearts are filled with sorrow as we note the absence from our meetings of one who had been so active in the deliberations of our Board and whose advice and counsel was so helpful to our membership.

Therefore, be it resolved, by this Board, that a copy of this Resolution be spread upon the minutes of this meeting and that we extend to our brother's family and friends our sincere sympathy in their sad affliction.

R. J. WELD, Chairman.
W. C. BLACK,
G. G. HUTCHISON.

The SECRETARY: Mr. Chairman, I move the adoption of the Report of the Committee on Resolutions.

MR. HUTCHISON: Mr. Chairman, I second the motion.

The CHAIRMAN: Are there any remarks?

The SECRETARY: Mr. Chairman, it is always with mingled feelings of joy and sadness that we consider reports of this kind. Reference was made in the report to the fact that we believe that our good friend, who has been attending with us in the work in which we are engaged, has gone to a higher and brighter life and that, of course, ought to be a source of rejoicing to know that a redeemed soul has entered into that life that has no night and that is everlasting. And yet Mr. Sexton was so near to many of us by association, was so highly esteemed by us, that we miss him; we miss him not only here but in the ordinary private walk of life.

I have known Mr. Sexton for a number of years. He was a member of the House of Representatives during a part of the time I served in the Senate. I always found him to be a courteous and affable gentleman, a gentleman in his instincts and manner. He was not only a gentleman, but a Christian gentleman. In every act of his life you can see his conscientious record for that which he considered to be right. As a member of this Board he was active; always at his place of duty, ready to meet any call made upon him; and as I stand here today I want the fact recorded that I personally miss Mr. Jason Sexton in the work of the Department.

I did not wish to make any extended remarks, but I felt, Mr. Chairman, like saying this much before this resolution should pass.

The CHAIRMAN: Any other gentleman have anything to say?

MR. JOEL HERR: There was no member of the Pennsylvania State Board of Agriculture nearer to me in my personal regard and personal friendship than what Jason Sexton was: A man of age,

ripe experience, high culture, agreeable personality. I want to mention one particular that the Secretary did not mention. While I agree with all that the Secretary said, and appreciate that he has said it better than I could, I want to allude to his spirit of patriotism: A most thoroughly loyal man, a member of the Grand Army, a man who served in a New York regiment during the entire Civil War, and who always had a good, warm side for the veteran, and he was taken away suddenly while making a patriotic address on Memorial Day; a sad thing to think of. He was just doing what he prided in, what he loved to do. He loved to talk with his old comrades and as comrades we very greatly miss him. I have been at his home. In his family he was a most honorable, pleasant man; and I say we will miss him. No member of the Board will be missed more than Jason Sexton. He has filled every position on the Board, and he never filled any position except with the greatest credit to himself and to the Board.

MR. HUTCHISON: Mr. Chairman, I wish to add a word on the life of Jason Sexton. I knew him from the time I met him first when he was serving in the House as a Representative from Montgomery county. I always found him true to the interests of his people, true to the interests of the farmer and a true man in all callings of life.

I knew him as a member of this Board, always courteous and brotherly, always kind and ready to do his part and do it well. I knew him as a true friend. I speak from personal experience. At a time when some controversies were going on, in which I was interested, before a large body of citizens of this Commonwealth, in which we differed in the matter, he was requested to take issues in that matter and to take sides against what I thought was right, and which was a personal matter to me, and he came and laid his hands on my shoulder and said: "George, I will not do it." That remained with me through life until this time, and I feel more today as though I lost a relative than losing one who is no blood kin to me in the death of Jason Sexton. There are few men who come up in life in this State or come from another state into this State that lived to make that life a truer life than he did. He always met us with a smile and a kind word and we men will miss him greatly in the work of this Board. I would say that I know and I feel that these resolutions express the truth when we say that he has gone to a place where he will forever and ever be happy.

The CHAIRMAN: My feelings compel me to pay a tribute of respect to Mr. Sexton. I knew him for long years and a good many members of the Board remember of the loved friend and neighbor. I always found him to be an upright, true Christian gentleman, and a man of great decision of character. He was one among the oldest members of this Board and always, as has been said, ready and willing to do his full part in anything that was assigned to him. I therefore want to endorse everything that has been said. Peace to his ashes.

DEPUTY SECRETARY MARTIN: Mr. Chairman: In the taking away of Mr. Sexton I have lost a warm personal friend; the Division of Farmers' Institutes has lost a wise, tactful and discreet

County Chairman of Institutes; a man who had within him powers of concentrating the forces in agriculture in his own county such as few men possess. He was a man loyal not only to his friends, but always loyal to the cause he espoused; loyal to his country; loyal to his God and loyal to the State. The State Board of Agriculture has lost a wise counsellor and friend and the Department of Agriculture has lost the same. We take comfort in the thought that he is marching along amongst the throngs on the other side.

MR. DURNALL: I felt deeply at the time the death of Jason Sexton and I have always thought and been enabled to say that it was manifest in him that "an honest man is the noblest work of God." He was a man that the world is better for him having been in it. He was a man of strong convictions and a man that was uncompromising in principle, a man who tenaciously upheld that which he believed to be right yet was always willing and always charitable to an opponent who had other convictions and was willing to concede to that opponent the right to sustain his convictions without any enmity or harsh feeling. I readily know that what Mr. Hutchison said was true, that where he thought he was in any way, by sustaining a position, likely to wrong an opponent, he refrained. This humility, this sinking of self was very strong in Jason Sexton, and it is a quality, a characteristic that it would be well for all of us to emulate.

MR. JOEL HERR: Mr. Chairman, I move the report be adopted by a rising vote.

The motion was seconded, put and agreed to.

The CHAIRMAN: We will now have the report of the Executive Committee if they are ready.

Dr. Conard then presented the Report of the Executive Committee as follows:

REPORT OF THE EXECUTIVE COMMITTEE

To the Members of the State Board of Agriculture of Pennsylvania:

Your Executive Committee beg to submit to you the following appointments and assignments: (See page 7.)

Respectfully submitted,
M. E. CONARD, Chairman.

The CHAIRMAN: You have heard the report of the Executive Committee. What action will you take upon it?

On motion the report was adopted as presented.

The CHAIRMAN: Is there any other report ready? It appears not. Is Mr. T. E. Martin present?

The SECRETARY: I will ask Mr. Hutchison to go upstairs and see if he is at that meeting.

MR. DURNAIL: Mr. Chairman, if there is nothing before the meeting may I have a minute?

The **CHAIRMAN:** Yes, sir.

MR. DURNAIL: I would like to call attention to the persons present to the remarks and the subject referred to by the Principal of the Perkiomen Academy yesterday afternoon before adjournment. It is a question that has deeply impressed itself upon my mind for several years of the necessity of getting the boy and the science of agriculture nearer together, and how best to do this was given to us yesterday as the ideas of that Principal. I would like you to take it home with you and give it more than passing thought, as to the education of the masses; to train the boys, to educate them *to* and not *from* the farm through the medium of our public schools and how they can best be reached through that medium. I have a plan worked out in a way, crude state, which I am going to have brought before the attention of our farmers' institutes in Delaware county next month, by papers from various practical men along that line. We have a system partially worked out. I do not know whether it will be made practical or not, but it is up to each one of us, it is our duty and here is our opportunity to prepare the rising generation. We have to take care of an increasing population that has almost increased itself twenty-fold within the last one hundred years in the United States, and we can readily see what we may reasonably expect within the next twenty-five years and that the boys and girls born today will have this labor on their shoulders. Therefore, I would say and I earnestly request you to carry this with you to your home, to your neighborhood and through whatever medium you can best reach the masses, do it.

The **CHAIRMAN:** We will now have the Report of the Committee on Legislation, Hon. H. G. McGowan, Chairman.

Mr. McGowan then presented the report of the Committee on Legislation as follows:

REPORT OF THE COMMITTEE ON LEGISLATION

We the Committee on Legislation beg to submit the following report and would respectfully recommend as follows:

1. That the real estate owners of Pennsylvania demand a just equalization of taxation in this State. We would reiterate that if personal and corporate property were taxed at the same average mill rate that real estate would be taxed, personal and corporate property would be required to pay forty-five million instead of twenty million. We further believe that a great help towards the equalization of taxation is found in the proposition of having the State pay the minimum salary of school teachers for the minimum school term. To correct discriminations that exist against the farm and farm owners of Pennsylvania, we respectfully insist that the State either assume a larger proportion of the cost of the local

government, or give the local governments authority to tax personal and corporate property in each unit of government. The local government of our State could be further relieved by appropriating a minimum sum per mile to counties and townships for road purposes equal to 100 per cent. of the cash road taxes paid each township. Let the State assume, with the aid of the National government, the entire construction of interstate and inter-county roads and maintain the same.

2. If we have not sufficient revenue for the advanced government of the State, an additional tax of one mill could be placed on all personal and corporate property with a small tax on the gross products of mines, oils and gas wells and similar enterprises. An increase license on automobiles would greatly assist in increased revenues, and such revenues received would greatly assist in increased revenues, and such revenues received should go specifically for road purposes.

3. We, your Legislative Committee, would suggest that some remedy be presented, or law enacted to regulate the improper use of public roads by teams and cutting them up and almost ruining our public roads through heavy hauling over them without paying any damages to townships, many times ruining the roads for miles. Permits should be taken out, through the Board of Supervisors, before using the roads for continuous heavy traffic. When a public road is almost entirely ruined, many times to the extent of several hundred dollars, some specific remedy should be prescribed by law.

4. We heartily endorse the Good Road Movement that seems to have taken a new lease of life in our State. We highly appreciate the generous efforts of the Pennsylvania Railroad Company in furnishing an educational train to traverse the State from east to west in the hope of bringing out a more determined effort to construct permanent roads all over our great State. We recommend the election of a County Engineer of Public roads, similar to that of a County Superintendent of Public Schools.

5. The purchase of the old toll roads of the State does not appeal to us as fair, inasmuch as many counties in the past have freed the toll roads and bridges at the expense of their own counties to the amount of many thousands of dollars.

6. We believe in the intelligent use of the King Drag for our public dirt roads. We would recommend a law compelling telephone companies to interchange messages.

7. We believe that our farmers are much interested in the passage of a law providing for a State Agricultural Fair. Too much cannot be done for agriculture, either by the appropriation of money or by the passage of new and effective laws.

8. We want a law compelling seed dealers to label seed bags either strictly pure, or as containing a percentage of inferior seeds. We are glad to say, however, that our worthy Secretary has now in course of preparation a bill fully covering this subject.

9. We recommend the Initiative and Referendum and Recall system as it is now practiced in Oregon.

10. We further recommend that an appropriation be made by the State to pay the deficiency to the different agricultural societies throughout the Commonwealth for premiums, in accordance with the provisions of a law which now allows each county in the State \$1,000 for premiums on agricultural exhibits.

11. For the furtherance and increased spread of Agriculture and Agricultural Literature, we favor the proceedings of the State Board of Agriculture to be placed in the various public schools throughout the various counties of the State.

12. We disapprove of a law which inflicts a license fee for hunting game throughout the State.

13. The State Livestock Breeders' Association are doing valuable work in extending and spreading the thorough breeding of animals, greatly improving the different breeds of livestock throughout the Commonwealth of Pennsylvania.

14. The good work of our State College is apparent to us all, however, it is inadequately equipped for the accomplishment of telling work. The Poultry Department of the College is without buildings and equipment for carrying into telling effect the proper development that should be, along this important branch of agriculture. We would most earnestly recommend to the present Legislature that sufficient appropriation be made for such buildings as is so much needed for the proper carrying out of modern methods along all lines of new agriculture at State College.

15. We join in hearty endorsement of the rapid development of our State Horticultural Society and compliment the society upon their magnificent display of fruit as seen in the Johnston Hall of this city.

16. We fully recognize the efficient work of the Department of Agriculture and come with words of praise for the improvement of the new law regulating the manufacture and sale of Commercial Fertilizers. We would, however, recommend a more simplified method of computing the value of a ton of fertilizer by omitting much of the wording placed upon the outside of the sacks of fertilizer.

17. We heartily endorse the sentiments expressed by Governor John K. Tener before this body yesterday, namely: That roads should connect county seats, and run perpendicular to and not parallel with our railroads. That the State should have some well devised system of road making, and that all revenues be used to relieve local taxation.

18. For the further stimulation of agriculture, which is the foundation of all our material wealth and prosperity, we would recommend that agricultural societies, instituted for the spreading and development of agriculture, owning their own properties and holding annual fairs, be exempt from the burdens of taxation, as this would greatly assist and relieve pecuniary obligations.

19. In conclusion, we would, to the best of our ability, impress upon the farmers of Pennsylvania the necessity for increased vigilance in zealously guarding their profession from the attacks of the outside interests. We believe that the proper position of the agricultural industry cannot be secured until the farmers get together through their own organization and demand the passage of laws that are fair and the election of men to executive positions who are not biased in favor of the selfish interests which prey upon the people who produce.

We believe in improved methods in agriculture and know that the productiveness of our farms should be and must be increased; yet, we also feel that it is not by method that the farmer will come into

his own as a producer and a real part of our social and business scheme, but, by legislation and the proper execution of well meant laws.

Respectfully submitted,

HOWARD G. McGOWAN, Chairman.
A. J. KAHLER,
S. S. BLYHOLDER,
E. B. DORSET.

The CHAIRMAN: You have heard the report of the Committee on Legislation. What action will you take upon it?

MR. BRONG: Mr. Chairman, I move the acceptance and adoption of the report.

The motion was seconded, put and agreed to.

MR. SELSER: Mr. Chairman, may I have the privilege of speaking just a moment? I did not hear any report on the subject of diseases of bees which I presented and which was referred to the Legislative Committee.

MR. McGOWAN: We did not have that material on hand, I am sorry to say. It was not in in a formal way and we overlooked it.

The SECRETARY: Mr. Chairman, I move you that the report be amended by inserting a recommendation to the General Assembly now in session that an act be passed providing some method for the extermination of what is known as "foul brood." If you will accept that as an amendment to the report it is not necessary to report upon it.

MR. McGOWAN: We certainly will do that.

MR. DURNALL: If not too late, may I ask for the re-reading of portion of the report in reference to the minimum salary of teachers of public schools?

The CHAIRMAN: It will be re-read.

Mr. McGowan read as follows: "We further believe that a great help towards the equalization of taxation is found in the proposition of having the State pay the minimum salary of school teachers for the minimum school term."

A Member: I would like the clause read in connection with the telephone question that was raised.

The CHAIRMAN: It will be re-read.

MR. McGOWAN: I am glad to see that you look over these things. That is what we want. We only recommend these things and if they are not the pleasure of the Board we don't want them. We believe they should be in the interest of the whole Board. I will read the clause in reference to telephone companies:

"We would recommend a law compelling telephone companies to interchange messages."

That is a matter that was referred to us. I do not know whether I am prepared to explain the purport of it.

The SECRETARY: I take it that the purpose of that recommendation is that the Legislature shall enact a law providing that the various telephone companies throughout our Commonwealth shall be compelled to exchange with each other. Now here is a local company that is doing business and is very important to the community in which it has been established in keeping up communication with the farmers and with the people of the local ty, and yet certain companies by which they can reach sections beyond the section occupied by their own company refuse to connect with them. If a man has a phone that belongs to a local company and he wants to get away off, a long distance, wants to send a message to Harrisburg or Philadelphia, they won't connect. That is my thought of what is meant by that.

MR. MCGOWAN: That covers it.

MR. BLYHOLDER: That is exactly the idea of this Committee, as an instance of that kind was brought to the attention of the Committee where a company, principally of farmers, in this State with between nine hundred and one thousand phones had been connected with one of the larger companies, and, as we were informed, because certain things did not go just exactly as they wanted—they would not agree to a merger with the larger company—they immediately cut them off and would not forward their messages. Now, you see that is affording them a chance for a monopoly and I feel that it is just and right that a law of that kind be enacted to compel other companies to forward messages from another.

A Member: Mr. Chairman, I would like to say a few words on the telephone business. I am interested a little bit in a talking company as president of a little telephone company. We have a nice little business among ourselves. We try to keep our lines in condition so that the larger companies, the Bell and Independent Company of York State, are very anxious to exchange courtesies with us and do business with us. On the other side of us is another little company that we exchange courtesies with, two mutual companies, and both companies are chartered. I don't want to say that in a braggish way at all, but we take a great deal of pride in trying to keep our company lines and connections and apparatus in good condition and repair so that we can talk through them when the larger companies connect with us or we seek to connect upon their lines they cannot find any particular fault with us. I think the recommendation is all right in one sense. I think that they should be obliged to transfer and transmit our messages from our local lines, but back of that the local companies should be under obligations to keep their apparatus in first class shape. You travel through some of the country up there and you will see some of the lines lying on the ground, and you see their poles tipped, this way and that and cracked, and their apparatus is in a bum shape, to speak plainly. I don't blame any good organization like the Bell Telephone Company or the Independent or York State or any of these Independent Companies for being particular as to how their service is held up by some cheap bum service of some local places. I am satisfied, gentlemen, that there will probably be something done in the

line you speak of because there is a feeling among the rural districts that they should be let out; but, gentlemen, I think there should be something legislated in there to stop a class of persons who take no pride in what they do from infringing upon the man who has some pride in what he does.

The CHAIRMAN: I am glad that has been brought out. I feel as much interested in this question as anything in that report.

MR. GEARHART: My attention has been called to the circumstances which brought about this resolution. The difficulty has arisen in the northwestern part of the State. As I understand it, a local company has organized and built a line. They first connected up with one of our prominent telephone companies of the State, which I don't care to mention, and it was all satisfactory as long as they were the only people connected with it; but later they coupled up with the Bell Company so that they could have service from that company. The other company immediately disconnected and has refused since to transmit messages over their wires. I think that is where it originated, not because of inferior service but because they would not allow the rural company to have service with more than one of the big companies.

The CHAIRMAN: We have a personal experience. There is a demand that we have an outlet greater than our company furnishes and there seems to be a disposition on the part of the two leading lines in our State, the United and the Bell, to furnish this and they are willing to do most anything for us, so they say. But the result is that neither gives us that outlet. They will do nothing for us as long as we stay out and don't let them have the whole control and we don't feel like doing that. I am in accord with what the one gentleman said that there is something due on our part but when we do our part we are not quite ready to be absorbed because we want this local telephone business and we also want an outlet on the general trunk lines; and this, in part, was inserted to get up some enthusiasm and discussion. We don't propose—I am a member of that committee—to outline a law here at all. We only suggest it for your consideration. There is a law on the statute books, if I am not wrongly informed, in regard to the railroads and it is a mooted question whether it don't apply to the telephone lines; at least the attorneys think that if brought into they would have to come in under the same law as railroads.

MR. WELD: Everything works all right so long as we connect with one trunk line, but when we attempt to connect with the two there is trouble. Now it has been suggested that if legislation could be put through and these matters submitted to the Railroad Commission with their powers increased, that such matters might be adjusted amicably and everyone be benefited. It seems to me that would be a good solution of the problem. There are rights on both sides. There are rights for every corporation and company and their business interests that have to be looked after. If a commission that was not personally interested could be a judge in these affairs it seems they may be amicably adjusted and everybody treated right.

MR. WILSON: I would like to have the section of that report read in reference to the lumber business and the use of the public roads.

The **CHAIRMAN:** The Chair will read it.

"We, your Legislative Committee, would suggest that some remedy be presented, or law enacted to regulate the improper use of our public roads by lumber teams and cutting them up and almost ruining our public roads through heavy hauling over the roads without paying any damages to townships, many times ruining the roads for miles. Permits should be taken out, through the Board of Supervisors, before using the roads for continuous heavy traffic. When a public road is almost entirely ruined, many times to the extent of several hundred dollars, some specific remedy should be prescribed by law."

MR. WILSON: Now in regard to that clause, it has got to be that we have not a monopoly of the lumber business in Pennsylvania. We have to compete with Southern states and other states that have no such a law, and I think that this will almost paralyze the lumber business in the western part of the State. It has got now that the lumber tracts are far distant from the point of shipment. The lumber that is handy to transportation sources is almost all used up. The lumber tract is the highest priced tract generally in the county. It pays the most taxes, and I don't see why we should ask for a law that would discriminate against the lumber business. They pay a high tax.

And another thing: Lumber bills now are almost always cut to specifications and require delivery in certain time. When you give a bid on a bill of lumber and it is accepted there is a specific time to deliver that lumber to the railroad station and if you cannot haul it over the roads I don't know what we are going to do. The lumberman pays as high a tax as any person and I think he should have an equal right to the roads at any time of the year as the farmer or any other citizen of the Commonwealth.

As I said before, we have no monopoly. We have to compete with other States in the price of lumber, and lumber prices have been on the boom for years lately same as anything. I think the lumberman should have equal rights on the public highway with any other party or persons doing business. I think it is working an injustice to the lumber interests of our State if we cannot compete with the other States that do not have this law.

MR. HUTCHISON: I hope that that portion will be stricken out of the report. I don't believe it would have any effect if taken up with the Legislature. I don't think it is constitutional; that a man, because he is hauling lumber on his wagon, cannot haul certain amounts. If it was something to regulate going over the public roads, prohibiting hauling a load beyond a certain weight, then it might pass, but to pick out one industry like that, I don't think it is a good idea. I am not much on legislation but the thought just comes to me that that would not be constitutional at all, and we

should not go on record for such a good report with so many good things in it and have something that would weaken that report like this in it.

We have men in our section who are heavy tax-payers and who have some timber. These men farm in the summer. At this time of the year they are engaged in taking out the timber and hauling to the market where I live and to other points. Why should not these people have the privilege of going on the roads. There is no hauling on the roads like fifty or sixty years ago when six horse teams were hauling for the iron works in certain directions; and we are making a mistake going on record for something not feasible, that will not be considered, and I believe to be unconstitutional for the reasons that I have stated.

MR. MCGOWAN: I don't think that was the thought of the committee at all, to make any discrimination and simply pick out lumber teams alone; but the thought was heavy hauling over a certain weight. I know a case in which the roads were almost entirely ruined possibly for three or four miles in length through heavy hauling, roads that were in direct line to market over certain sections of the county, and the market men were obliged to take another road that would add two or three miles to their distance going to market as these other roads were in such a condition as to be impassable.

MR. HUTCHISON: Could not there be incorporated that no tonnage could be hauled in wagons except those with a tire, say of a certain width?

A Member: There is such a law on the statute books now.

MR. MCGOWAN: It is just this: It seems to me there is no control. For instance, stone men might come in and use a road for two to four miles and tear the foundation up and fall out with the supervisors for not keeping the road in shape, and stay there for a year or more and not even thank the supervisor for the use of these roads and leave them in a position that would be an expense to the township of several hundred dollars. It was the thought of the committee to feel around and see if there was not some way by which these people would have to take out a permit before they could do this heavy hauling, that they would have to get in line with someone in power, and it seems to us that there ought to be a way of taking this up with the Board of Supervisors that they might use a road between two given points and either agree to let the road remain in the condition in which it was before or get permission at least of this Board in some way. I know the townships have greatly suffered and sustained losses by heavy traffic.

MR. BARNES: I live in a section where we have one of the longest stretches of State road in Pennsylvania, a distance of about ten miles, and we don't have much trouble in going on that road as long as our people continue to haul heavy loads on broad tired wagons. I think it would be a good move to compel the citizens of this Commonwealth to haul on tires not less than four inches broad any amount over two tons. It would be one of the easiest ways to keep the public highways of this State in better condition. A tire

four inches or over that is almost equal to a road roller where used continuously, one wagon following another as around lumber camps and where there are industries of that kind in existence.

MR. DURNALL: This is a subject that is covered in a measure by reciprocity, as I travel over your district and you travel over my district. That is the way we usually propose to solve the problem. But I happen to be one of the number that are sufferers in our district from the fact that there are manufacturing works established just over about one hundred or two hundred yards in another district, where they don't contribute one cent of taxation toward the support of our public roads and streets; and yet there are as many as half a dozen different teams from this one establishment of two to four horses, with from one and one-half to three tons on a load, with a three-inch tread wagon, traveling over the road every day in the year, cutting and rutting these roads that are thoroughly improved at great expense; and yet they don't contribute one dollar and we cannot reach them. That is just what we want to cover. Any other travel we are interdependent, one township upon another, one county upon another, one state upon another; but it seems to me there should be some relief in cases that are extreme, when the persons are reaping all the advantage and all the accommodation and does not have to accept one cent of responsibility.

The **CHAIRMAN:** I would like to have an expression. We may carry it too far.

MR. BLYHOLDER: It is only to create sentiment and I think it is worthy of some thought. I think we are getting information now that we want and I think the committee is getting exactly what they desire. It seems to me now that instead of naming any particular class of teamsters we make it general. Now in the township in which I live, I want to say in reply to what the gentleman to the right said that a four-inch tire is very well so far as it goes, but in my township in the past summer they used twelve-inch tires and broke down nearly every bridge but one, and they used ten teams of horses in one wagon. It is extreme cases and cases of that kind that we ought to provide for, hauling as much as twenty to twenty-two tons upon one wagon. Now, pretty nearly all the bridges on the road were broken down. Of course, where there were large bridges and in danger of going down and losing they would brace them up; but the small bridges were all broken down on these roads. It is in such extreme cases that we want relief. By the way, the corporation that did that hauling does not pay one cent of the road taxes in any district. They have a plant in the district that is worth two hundred thousand dollars but we cannot get one cent of tax from it. So I think that it is in such cases as that that the committee has made this recommendation.

MR. MCGOWAN: We have had a like experience in our county. The loads required as many as fifteen teams to haul them and they hauled during the Fall when the roads were soft and sometimes they started with fifteen teams and would have to get others on the way to help and there is not a run bridge but what is broken down. Of course they have fixed them up temporarily. But I think there ought to be a way by which they could be reached, but not pick out the lumber team alone.

MR. ESCHBACH: My solution is to make the roads better and make the bridges strong enough to carry whatever is to go over.

The CHAIRMAN: What is the pleasure of the Board in regard to this section?

MR. MCGOWAN: Mr. Chairman: We might make an amendment to that, to strike out the word "lumber" and make it apply to all heavy team hauling.

A Member: I offer an amendment to that effect; that the word "lumber" be stricken out.

The question was put and the amendment agreed to.

MR. WILSON: Mr. Chairman: There is a reference to the game question that was brought up here. There is not much said about it, but districts out our way are interested in it and I would like to have that read.

MR. MCGOWAN: That section reads as follows:

"We disapprove of a law which inflicts a license fee for hunting game throughout the State."

MR. WILSON: I am much in favor of this license bill. This is a license for the whole open season; and then in the Spring of the year when the woodcock season is in and groundhogs. A man who cannot pay one dollar for that much sport during the season should not own a gun, and the miners and workmen want this sport. In our section it is the fellows that don't work much who roam around and the less they work the more dogs they have.

MR. GEARHART: Mr. Chairman, I rise to a point of order: There is nothing before the body but the adoption of the motion as amended.

The SECRETARY: The point of order is not well taken. It is the report that is before us and we are amending the report, taking it up seriatim and amending the report and after we are through with whatever amendments are to be made the report will be adopted as a whole.

MR. GEARHART: I don't think you understand the situation. The amendment was to strike out the word "lumber" and the amendment was adopted but the section as amended was not adopted.

The CHAIRMAN: All those in favor of the adoption of the section as amended will so signify.

The SECRETARY: Are you adopting the report now?

The CHAIRMAN: Just the section as amended by striking out the word "lumber" and making no discrimination, simply letting it apply to all heavy hauling.

The SECRETARY: My understanding is that that will be an amendment to the report. The report says "to regulate the improper use of our public roads by lumber teams cutting them up and almost ruining them by heavy hauling. The amendment is to strike out the word "lumber" and substitute all heavy hauling. That is

an amendment to the report. Now my understanding is that it is our province to go through the report and make such amendments as necessary, and after the report is properly amended then adopt the report as a whole. Perhaps I have not heard all that is going on here and may be mixed as to the form in which the motion was made.

MR. MCGOWAN: This is the only amendment made so far and if we adopt that then we are ready to adopt it as a whole.

The CHAIRMAN: We are now voting on this clause as amended. The question being put, the section was adopted as amended.

The CHAIRMAN: We will now vote on the adoption of the report as a whole.

The question being put, the report was adopted as a whole.

The SECRETARY: Now, Mr. Chairman, I want to inquire whether it is thought to be the duty of the Committee to do what it can for securing this legislation. My understanding of the duty of the Legislative Committee is not so much to propose legislation as to endeavor to see that it is carried out, and in order that we may have an understanding as to what the Committee is to do, I move you that the Committee be instructed to use their best efforts to secure the legislation they recommend.

MR. BLYHOLDER: We are very thankful for that motion for the confidence reposed in us; but I want to say to you that the Committee is to recommend. You have adopted the recommendations of the Committee and it is your work to see that it is carried out. We will do all we can.

MR. MCGOWAN: I can readily see why Mr. Blyholder talks that way. He was anxious to go to the banquet and he stayed only a few minutes. He said: "You go on with the work of this report." We adjourned at eleven o'clock and he had not returned.

The CHAIRMAN: I had the honor of being on that committee for a number of years. I have done as much as I could do. I have spent four or five days to see some measures enacted into law, and I think this committee will do everything in reason to see it is enacted into law.

We have one more item on the program, "Tile Drainage," by Mr. T. E. Martin, of West Rush, N. Y.

Mr. Martin then delivered his address as follows:

TILE DRAINAGE

By T. E. MARTIN, *Syracuse, N. Y.*

We are realizing more and more every day that tile drainage is a very important factor in the successful pursuit of agriculture, and there is no doubt that where tile drainage is needed and is done it will soon repay more than its cost. Some people try to improve their farms in other ways. They will erect good buildings or in some

way improve the farm. That is all well in its place, but just remember that buildings will not make a farm but a farm may make buildings, and if the soil is wet it will pay to drain it. Many dollars are spent for fertilizers and I know that if such money was spent in buying tile and putting them into the ground it would have paid much better. We are constantly looking for paying investments. Tile drainage is one way to invest money in such a way that it will pay sure and large dividends annually without the aid of an investment company watering the stock. Tiles abhor water.

I would just like to take up the soil for a few minutes. Soils are made up of innumerable small particles. These vary in size and shape and touch each other, more or less, according to the compactness of the soil. It is said by scientific men that soil particles vary in size from 4-100 of an inch to 2-10000 of an inch in diameter. (Blackboard illustrations used throughout.) If a soil is made up of very small particles there are more particles in a given quantity of soil, and of course, we have consequently more soil spaces. The smaller the soil spaces, the closer the particles lie together and the more resistance offered drainage and consequently more drought resisting. The coarser the soil particles the less resistance offered drainage and drought. Therefore, the soil is made up of spaces largely. These spaces are said to range from thirty-seven per cent. in coarse soils to sixty-five per cent. in fine soils. If we have fine soil particles we have more space in the soil and vice versa with coarse soils. Now these spaces in the soil perform several offices, three important ones. They provide for the drainage and removal of the water from the soil and aeration. Also, they provide for capillary attraction to be re-established—a triple mission being performed. Here is the surface of the soil. Rains come and the soil is thoroughly saturated with water. If the soil is coarse or fine, the water table gradually lowers accordingly if an outlet is provided. Here is one tile drain and here is another over there. As the soil is saturated with water, it commences to pass off through the drains. The water table in the soil gradually lowers slower and slower until it gets near the grade line. The water directly over and around each drain is the first to flow away to the depth of the drainage system. If drains are placed three feet deep, they would not drain to that depth over here, midway, probably only two and a half feet deep. If we place the drainage system three feet deep we do not drain all the land to that depth but perhaps around two and a half feet. Something must be allowed for the flow of the water through the soil. Now as the water goes down and out we can see how effectually the drains work. It will dry up wet stagnant soil so that it will grow any ordinary crop. I want to clear up one point. As the water goes down—just remember it is only the surplus and free water that the tile drainage system removes from the soil. As the water goes to the drains, each small soil particle retains a little bit as film moisture. This amount of film water ranges from fifteen to twenty per cent. of all the water a soil will hold. This soil above the water table—the drain level, has retained by surface tension all the moisture it needs. As the water lowers down to this drain level the excess water flows away by gravity off through the drains and capillary attraction being re-established brings the water from below this level up towards the surface. Drainage does not interfere with the sub-soil water below

the drains. We have just as much water below the drains as we ever had whether soil is drained or undrained. Capillary attraction brings up the sub-soil water from unbelievable depths. The finer the soil particles, the smaller the spaces which form tiny like hair tubes throughout the soil. They form channels, vertically, horizontally and diagonally in every direction. Now capillary attraction is the force which brings the water from lower to higher levels just as soil rises in and by the lamp wick to the flame. The water passes out of the soil by and through these same channels according to gravitation along the lines of least resistance. Water leaves the soil in obedience to the laws of gravitation. Drains have no magical power to draw or extract water from the soil. A cubic foot of water weighs 62½ lbs., and it is easy to see how water is compelled drainward. Here is a cubic foot of water weighing 62½ lbs., and another right here on top of same. It is easy to figure out the pressure on each 144 square inches of area. But the soil sort of dams up, stops, holds back the flow of water through the soil, so we do not get the full pressure. Here is a side view of the tile drain. The soil spaces nearest the tile joints are the first ones to flow into the tile. Next, the excess water from the soil flows into the empty spaces, then into the tile drain at the joints and not through the walls. The bulk of the water goes in a drain that way at the tile joints. It is too slow a process for it to ooze through the walls of the tile. Then the soil spaces nearest those emptied are the next to flow drainward. This flow of excess water drainward continues upward and laterally until an equilibrium is established throughout the soil. That is the way a tile drain relieves the soil of excess water.

Tile drainage is a permanent paying investment. I will now try to show you how we applied it. We had to do a good deal of drainage work upon our farm to get it in shape. We started in 1894 and we have 10 1-5 miles (3265 rods) on 57.85 acres of land. It has paid us many times over the cost—\$2,500. In the year 1908 our potato sales from 18 acres reached \$2,807.89, and the drainage system more than paid for itself that one year. Four tons of cured clover and forty-five bushels of wheat per acre are the other best yields. Right here at my left (indicating on blue print) was a large pond and here an open ditch and natural stream. It leaves our place at this point and goes across a neighbor's farm. All this work was done at our own expense and the distance 3750 feet. The work on this neighboring farm has cost several hundred dollars. That shows how we value tile drains. Not only this, but we have to annually clean this out at an expense ranging from \$10.00 to \$50.00. The fall is slight and consequently the water flowing there deposits sediment which must be shoveled out later.

A Member: I would like to know if your neighbor objected to your building a drain across his land?

MR. MARTIN: No; in New York state we had an old law, now amended. The law now is such that a man can go across a neighbor's farm, but if there is any damage, he is liable; but ordinarily there is no damage unless a new channel is opened or crops destroyed.

A Member: But if you do not change the regular channel of drainage he cannot hinder you, can he?

MR. MARTIN: No; you have the right to go on or over his property. That is the law in New York state. You can go on to another man's farm to deepen or widen or lower the depth of a natural stream. You can go down with reasonable depth and if he will not allow you to do so you can take proper steps to compel the establishment of your rights.

This is a map of our farm at West Rush (indicating). At the present time I am living in Syracuse. The top of the map is north and the right hand is east, the left hand is west and the bottom south. This represents 57.85 acres. This is the north line and the south line is right along here. The farm is rectangular. Here is a large open ditch. Here is the 3750 feet of draining that we just discussed, starts here and flows southwesterly. This is an eight inch sewer pipe main and the sub-mains and laterals flow into it. Here are intakes. Every one of these mains, sub-mains and laterals are numbered or lettered and all are indexed.

A Member: How large are the laterals?

MR. MARTIN: Three inches; all round tile. I would not recommend anything less. Where the grade is heavy and the soil is firm, smaller tile will carry the water, but often in certain soils, aeration of the land is as essential as removal of surplus water.

A Member: How far apart do you put your lateral drains?

MR. MARTIN: In our soil fifty-five feet apart. In some places we have a tight sub-soil. This is very important to know about, previous to laying out a drain system. I would work it up and I would keep track of it; keep account of the work daily so it can be accurately mapped out as the work progresses. I would use four inch pipe here for the reason that it gives greater and better aeration and drainage to the soil. There is as much improvement to some soils by aeration from tile drainage as we get from the mere removal of surplus water by the fifteen pound atmospheric pressure which forces air into the soil. As the water goes out, the air will go in if there is not an excess of water in the soil. Just opening up with tile will benefit it greatly, but not as much as by the removal of surplus water from a wet soil. Drainage warms and areates a soil while drying it. Now in laying out a drainage system, while there are many ways to do this there is one important point that should always be considered and that is to adapt the system to the land and not the land to the system.

A Member: How far apart do you leave these tile? You do not have the tile close up?

MR. MARTIN: We want the tile jointed close, just as close together as we can. We do not want them apart at all nor any open spaces or poor joints on upper side of tile line. Of course, such close jointing is not so important in firm soil. We join them as tight as practicable in quick-sandy and treacherous soil. The office of a tile drain is to remove the excess water from the soil. Just as soon as the soil particles commence getting into the tile drain with water there is dirt getting in and if the flow is slow and the grade light—not good, there is grave danger of the sediment lodging,

especially at the low places. Here is the grade. If there are little low places all the sediment going down the drain is going to lodge there. The water flows through tile drains under no different conditions than on the surface, along the lines of least resistance. If the fall is slight and the flow slow of course it is only a question of time before the system will fill up and become inoperative. Be careful about that. I want the tile jointed as close as I can get them. If there is a little opening down here on the under side or at the bottom I am not worried about that, but if there is an opening on top I pack it with clay or put a flat stone over it. If the water flows straight direct into the tile from the top it will take soil with it, but if in at the side or bottom, it oozes up and will not take soil with it, even if there is a little sediment in the surplus water entering a drain from the bottom and water flowing through same, it will doubtless be washed to the outlet.

A Member: How deep do you dig the ditch?

MR. MARTIN: About four feet deep. I am a firm believer in deep drainage. I do not say that is the proper depth. I do not know the conditions in Pennsylvania. The time is coming when alfalfa is going to be largely grown in my own state, New York, and here too I hope so and believe it will.

The SECRETARY: There is plenty of it growing in this state now.

MR. MARTIN: It is coming. The deeper down the drains are placed the less the roots are going to interfere with the drainage systems. Where there is water constantly flowing through the drains there is an inducement for the clover or alfalfa roots to enter the tile in drouthy periods. For instance, here is a spring flowing continuously through the year and here is a tile drain flowing from it. Here is the surface of the ground. If water is needed during a dry time the roots of the clover and alfalfa will have a tendency to get into it. But the deeper the drains are laid the less trouble we are likely to have from the alfalfa roots.

LAYING OUT SYSTEM

Suppose we had a rectangular field and wanted to drain it. If a valley passed down the centre of that and the slope of ground was at right angles to the valley. The proper way to drain it would be to put the main through there, the lowest places, and the laterals placed at right angles—straight up the slope. Or if the field had a slope, say angling to this low place down through the centre, the side drains ought to be placed like that at an angle of 45 degrees. (Illustrated on blackboard.) That would be the proper way to lay out the system. Run the drain straight up and down the slope, so each lateral takes water equally from either side. Drains running diagonally up a hillside take water principally from the upper side—an intercepting drain—half a drain giving only 50 per cent. efficiency where 100 per cent. is obtainable. Good drainage consists of parallel drains of good length and depth and so placed that the drainage reaches

A Member: Suppose out there thirty rods from that main there was a pool of water or a pond, how would you drain that pond?

MR. MARTIN: If the pool or pond was not too deep and soil firm I would run the drain right into and through the centre of it. If too deep with soft bottom, I would curve around it, each side with a lateral keeping drain in solid ground. Test firmness of soil with a steel rod. Later, perhaps one year, the soft ground will become firm. Then a central lateral could be put in.

A Member: Do you think one drain in the centre of a pond of one-half to three-quarters of an acre would be sufficient?

MR. MARTIN: No. If I had a pond like that to drain, I would try to run one main through here and when I got up here branch out like that each side parallel, 40-50 feet distant. Or, if the pond extended that way, put one or more laterals out that way. There are various ways it could be done. I would do it thorough with as few lineal feet of drain as possible.

MR. STOUT: Are you operating in the glacial district in New York?

MR. MARTIN: Yes; it is practically all glacial there.

MR. STOUT: What is the nature of the sub-soil?

MR. MARTIN: Soil is Dunkirk series with sub-soil generally of stony hard pan, clayey nature.

MR. STOUT: Clay?

MR. MARTIN: No; clay under part of it.

A Member: How do you get down four feet?

MR. MARTIN: Open up with a plow and finish with pick, shovel and modern drain tools. Try to do draining in the Spring when the ground is soft. Here is one problem. In other words, try to adapt the drainage system to the land and not the land to the system as I emphasized before. There are many drainage plans and they look nice on paper and each has its merit but it is a mistake to apply any one drainage system to all conditions because they will not work out well. Where the land lays in that direction or 45 degrees, angling to the main, that would be a proper way of laying out such a system but not recommended only for conditions of this kind. It requires more drain to drain an acre of land on that plan than the right angle plan. For instance, this main going down through there, that ground—60 feet wide strip—is double drained, where laterals cross it. Say the main draws thirty feet on this side and thirty feet on the opposite side with side laterals crossing same. This area has double drainage; avoid that. Here would be a little better system, running the laterals out at right angles. For this reason that while we have some double drainage here, we do not have so many feet of tile because the laterals run at right angles. There is a better system yet. If we have a square or rectangular field and the slope of the land be to the lower side of it, I would run a main up and out like that and put the laterals out this way—at right angles to main. If drains are placed sixty feet apart I would place this main thirty feet

from the side or end of field and laterals at sixty foot intervals. This main would draw to the side or end of field and there would only be this little double drainage area down here on one side.

This is the ideal way where it can be applied, but unfortunately it can not be applied only in a few instances. It could be applied to a field of five, ten acres or a large farm or tract of land, if the slope be that way and then down to this corner; or, it was not down to this corner and the lowest place was here it should be placed thus. That is the ideal way of laying it out. If the farm is rectangular it is easier to lay out and map up and easier to find these drains later on. For instance, if you put in every other drain this year, when this is laid, put in the branches at the proper places. Put in 3 or 4 by 6 "Y" branches for laterals in the 6 inch main drain and note their distances sixty feet from each intersection, and keep a map of the work daily. To facilitate future location of such lateral branches a short stake should be placed upright on main, at branch intersection, leaning against lateral side of branch and extending to within 12 inches of surface—below the plow point and dead furrows. This saves the labor of digging down to the main and branch. It is easier to find and put in the remaining lateral drains of the system. When you want to find lateral branches you have something to go by.

A Member: Through an area of quicksand do you advise putting planks under your tile?

MR. MARTIN: No; I would not put any plank or board under tile under any consideration if I could avoid doing so. Simply because here is an inch board under the tile. Usually cheap lumber is purchased for such work. In some sections it costs as much as the tile. And here is the danger. One board might last sixty years; another board might last some hundred years; and another board last longer or shorter. If the fall is *slight* these boards rotting down or out at different times will let the tile down accordingly. It is only a question of time until the drain fills up. At a large meeting recently, we had a discussion over it and one man told about using cement instead of boards in these soft places. I think it is an excellent plan. This is a wise way of avoiding future trouble in these quicksand places. Tile drainage should be a permanent improvement, returning annually and eternally large profits. Therefore the work and material used in construction should be enduring—a heritage to posterity more valuable the 100th year than the first. I would try to do this work through quicksand and springy places during the dry time of July, August or September when there is not so much water in the ground. For small springs, wet spots or tenacious clay that holds back the excess water, one foot in depth of coarse gravel, cinders or any suitable material of a permanent nature should be put on tile. This increases many times the rapid absorptive capacity of a drain. In our work we used horses and plows for the opening and closing work and hand tools for the remainder. The drainage cost us \$2,500.00, but we could not do that now because tile and labor are higher. We lay out our drains by setting a row of small stakes a foot long so that the plowman can easily see them—and when we are ready for the plowing one light furrow is run right down over the line where we want the drain to go, following the little stakes and a man ahead of the three horse team pulling them as he goes.

If the plowman plowed deep the first furrow, he could not hold up stakes on the return—opening a dead furrow over the line of the drain. Next we strike out a back furrow in the dead furrow and shovel out, replot lengthing hitch by chain and reshovel out the loose dirt. We can open ditch about $1\frac{1}{2}$ to $2\frac{1}{2}$ feet deep, sometimes more and sometimes not so deep. The ditch will necessarily be wider with more soil to handle, than where the ditch is all hand dug but horse work lessens cost materially. The top soil is put on one side and the drain and sub-soil on the opposite bank and filled accordingly. Usually the drains are opened in pairs for this reason: The top soil is placed on the right bank and the sub-soil of the next parallel drain is placed on reverse banks to facilitate in plowing in the drains by going up one bank and down the other. The only carrying of the furrow we have is across the ends.

A Member: In regard to boards decaying under the ground, is there any truth in the theory that boards constantly wet will not decay?

MR. MARTIN: Yes, I am sure that the time will come when they will rot out. I would not put anything in or under the drain system that would in any way decay or cause trouble in the future. As sweet memories of good work linger long after the cost has been forgotten it is highly important that only the best thought, labor and material be used. Especially be careful about everything that goes into the drainage system and make it as permanent as you possibly can.

A Member: In a case where a drain has to take in surface water at the end near your neighbor's fence where the washings and water accumulates, how would you get the water in the end?

MR. MARTIN: To take in the surplus water. We ran the drain up like that; nearly to the top of the ground. Here is the drain. Right at the mouth of it we dig out what we call a silt basin 1 to $1\frac{1}{2}$ feet below the mouth level. It is important to make the basin large enough to hold all the down coming mud. The mud lodges in the basin which is later cleaned out. Mud going in will cause trouble. We have special screen pipe at all intakes and outlets. We had considerable difficulty in getting them at first but not now. Such special pipe can be made by any sewer pipe factory. One-half holes are punched in the pipe while it is green and before burning. Let that represent an eight inch sewer pipe. That circle is the end of it. The holes are punched right there for four vertical 3-8 inch iron rods; 1 5-8 inch from centre to centre punched through the pipe, two inches back from the edge. Rods have an L hook on the upper end and they keep out muskrats, refuse, leaves, trash, etc. Each inlet, outlet (we have just one outlet and I would not have more than that if practicable) and special pipe is provided with these rods. Also these special pipe are set in a cement abutment. This cement abutment is valuable in several ways. It maintains the elevation of the drain, and stability of the bank which is not caving off from undermining by either animals or the elements, causing the outer pipe from getting down and filled up.

MR. KERRICK: Mr. Chairman, the Committee on Resolutions is now ready to report.

The CHAIRMAN: We will have the report read.

MR. KERRICK: Mr. Chairman, I will ask my friend, Mr. Joel Herr, to read the report.

MR. JOEL HERR: I want to say that some of these resolutions were submitted at a late hour and we had no time to prepare and typewrite our report. Some of the resolutions were presented to us and some are of our own manufacture.

Mr. Herr then read the report of the Committee on Resolutions as follows:

REPORT OF THE COMMITTEE ON RESOLUTIONS

To the Pennsylvania State Board of Agriculture:

We your Committee on Resolutions beg leave to offer the following report. We have studied the Resolutions submitted to us and report the following as meeting our approval:

RESOLVED, That we recommend to the General Assembly of our State, now in session, the passage of an act providing that fertilizer manufacturers shall, in placing their guaranteed analysis upon the packages containing their goods, make no statement of equivalents or any other matter than the simple statement now required by law.

Appreciating the valuable services of Mr. H. J. Wilder of the Bureau of Soils of the National Department of Agriculture, we would respectively urge the Federal Department of Agriculture to continue his services in Pennsylvania as we believe the time is ripe for great activity along the lines of soil investigation and its application to our various agricultural interests.

We would further ask that provisions be made for the further development of the fruit industry of the State as conducted by Prof. J. P. Stewart of State College.

We recommend for the Department of Agriculture such increased support from the State as the increasing work demands for its successful prosecution.

We heartily indorse the movement to establish in our State an Agricultural Fair worthy of our Commonwealth.

We recommend that the expenses of the meetings of this State Board of Agriculture be provided for as usual.

We appreciate the work of the Department of Economic Zoologist and recommend a liberal provision for the prosecution of its work.

We are in hearty accord with the movement to improve our public roads. We believe that State Roads should be built and kept in repair by the State, and that liberal provision be made to improve our Township roads.

Recognizing the great work of the Pennsylvania State College School of Agriculture and its greatly increased needs on account of the wonderful increase in the number of students, we most respectfully ask that appropriations be made for its support commensurate with its needs.

WHEREAS we believe that there never was a time in the history of our Commonwealth in which the importance of extended knowledge relating to successful agriculture was so fully realized as is the case at the present time, and Whereas, the prosperity of our State depends more upon the development of its agriculture than upon any other industry in which her people are engaged, therefore,

RESOLVED, That we recommend to the General Assembly now in session, an appropriation to the Department of Agriculture of one hundred and fifty thousand dollars, for the two years beginning June 1, 1911, to be devoted to demonstration and agricultural work, as the Secretary of Agriculture shall direct.

WHEREAS this Board, in the discharge of its official duty is brought into close touch with the Department of Agriculture, so as to be able to judge of the efficiency of the efforts put forth for advancing the agricultural interests of the Commonwealth and the enforcement of the laws enacted to secure this end

WHEREAS, we regard a proper administration of the affairs of the Department of inestimable value to the farmers of the State, and

WHEREAS, we regard the Farmers' Institute as occupying a very important place among the educational agencies employed for the advancement of Agriculture, therefore, be it

RESOLVED, That we take pleasure in recording our appreciation of the valuable services rendered to the Commonwealth by the present Secretary of Agriculture and his efficient Deputy who has charge of the Institute work, and believing that the best interests of Agriculture would be subserved by the continuance of their administration, we would respectfully recommend their reappointment to the places they now occupy.

F. D. KERRICK, Chairman.
S. SHAFFER,
J. A. HERR.

MR. WELD: Mr. Chairman, I move the adoption of the report as read.

MR. DURNALL: In regard to the resolution on fertilizer, I think in connection with that they should be required to put on their fertilizer bags from what source these different ingredients are de-

rived. Now we are told that nitrogen is derived from some cheap sources and is not then very available and that the chemist is kept busy to detect the source, and I believe it is an important matter that they should state from what source the nitrogen and phosphoric acid is derived.

The SECRETARY: Mr. Chairman, with regard to the matter raised by the gentleman here I wish to say, before retiring from the room before you enter upon the discussion of that last resolution, that we had a bill of that kind before the last General Assembly, and fertilizer manufacturers all over the country, men in whose word I have confidence because I believe there are honest men among the manufacturers of fertilizers, say that if that measure would become a part of the fertilizer law it would increase the price of fertilizer very largely. They say sometimes when they come up to the point of mixing a certain amount of fertilizer they want to put on the market and they have a large order for a number of carloads to be shipped at a certain time and they don't have perhaps as much nitrate of soda or as much dried blood as would be required in compounding this great lot of fertilizer which must be put on the market and for which they have an order, it is necessary for them sometimes to change from one thing to another. Sometimes they may have an order, as you know if you have been compounding fertilizers, in which they use nitrate of soda as the source of their nitrogen, they will have an order that must be filled promptly and they do not have the nitrate of soda and so they must take the dried blood or take tankage, get the nitrogen from some other source, and they claimed, in talking the matter over with the Committee that had the bill under consideration, that it would largely increase the price. I wanted you to know that fact before you acted upon the matter suggested by the gentleman here.

MR. JOEL HERR: Doesn't the law almost cover that which is in existence now. Nitrogen derived from certain sources will have to be specified. if leather scraps or wool waste?

The SECRETARY: If derived from leather, hairs or wool waste, or any of these insoluble materials are used, it must be stated.

The CHAIRMAN: I am glad that has been brought out before the Board.

The SECRETARY: Mr. Chairman, before you act upon that last resolution I hope Mr. Rodgers will take his seat as Secretary pro tem.

Mr. Rodgers thereupon took his seat as Secretary pro tem.

The question on the adoption of the report being put, it was agreed to.

The CHAIRMAN: Is there anything further to be brought before the Board? If not, we are ready to adjourn.

MR. HUTCHISON: Mr. Chairman, I move we do now adjourn, to meet at the call of the Secretary at the time chosen by the Deputy Secretary for the Round-up Meeting of the Farmers' Institute and Lecturers, at Lancaster, Pa.

MR. DURNALL: Mr. Chairman, I second the motion.

The motion was put and carried.

Whereupon adjourned finally.

A handwritten signature in cursive script, reading "A. B. Britchfield". The signature is written in dark ink and is positioned above the printed name of the Secretary.

Secretary.

Commonwealth of Pennsylvania.

DEPARTMENT OF AGRICULTURE

BULLETIN NO. 211

REPORT ON THE
Outbreaks of Aphthous Fever
IN PENNSYLVANIA

IN 1908-1909

BY DR. LEONARD PEARSON
STATE VETERINARIAN



HARRISBURG:
C. E. AUGHINBAUGH, PRINTER TO THE STATE OF PENNSYLVANIA
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Commonwealth of Pennsylvania.

DEPARTMENT OF AGRICULTURE

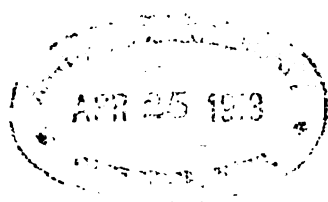
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Department of Agriculture



PREFACE

The outbreak of Aphthous Fever or Foot and Mouth disease among cattle in the State of Pennsylvania during the fall of 1908 was a matter that attracted the attention of livestock breeders and others interested throughout the whole of the United States and portions of Europe, and the incredibly short time in which the disease was stamped out resulted in a wide-spread inquiry concerning the extent of the outbreak and the methods employed for the eradication of the dreaded disease.

The campaign for the extermination of the malady was organized and led by the late Dr. Leonard Pearson, who was assisted by the Bureau of Animal Industry of the National Department of Agriculture. Dr. Pearson, at the time, occupied the position of State Veterinarian and Executive Officer of the State Livestock Sanitary Board, and his report in relation to the outbreak and its treatment was published in the Annual Report of the Pennsylvania Department of Agriculture for the year 1909.

The demand for this publication was unusually great, on account of the general interest felt in Dr. Pearson's report by farmers, stockmen and veterinarians in this and other countries, and as a result, the entire edition of the 1909 Report was exhausted long before the demand for the same was met.

In order to give the Pearson Report as wide a circulation as possible, a bill was passed by the last General Assembly providing for its publication as a Bulletin of this Department. This bill received the approval of the Governor on the 14th day of June, A. D. 1911.

N. B. CRITCHFIELD,
Secretary of Agriculture.



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A REPORT ON THE OUTBREAKS OF APHTHOUS FEVER IN PENNSYLVANIA IN 1908-1909

By LEONARD PEARSON, *State Veterinarian*

THE OUTBREAK AND EXTENT

About the middle of October, 1908, some cattle in Michigan developed Aphthous fever or foot-and-mouth disease. The method by which these cattle became infected will, no doubt, be determined and disclosed by the United States Department of Agriculture.*

The extent of infection in Michigan was very limited, the disease was of mild type and was confined to the farm upon which it originated and to a few farms and places to which cattle were sent from the source of the disease. Unfortunately, some of the diseased cattle were sent to the stockyards at Detroit, Mich., and thence infection was carried to the stockyards at East Buffalo, N. Y., and by way of Buffalo to Pennsylvania. It appears to be probable that little, if any, infection came direct from Michigan to Pennsylvania, but only indirectly in the bodies of cattle exposed in the Buffalo stockyards.

The occurrence of foot-and-mouth disease in Michigan and in New York was of earlier origin than in Pennsylvania, but the existence of the disease there was not known until a search was made for the origin of the infection that, it was clear, had come to Pennsylvania from Buffalo.

A carload of infected or exposed animals was shipped from East Buffalo, N. Y., October 26th, 1908, to Danville, Montour county, Pa., by J. C. Campbell. These cattle arrived in Danville October 27th; they were sold October 28th, some were delivered to purchasers the same day and others October 29th. It is said that these cattle did not show distinct evidence of disease at the time they were sold, although some were observed to be sluggish and "stiff." The carload was made up of ten steers and nine bulls. The ten steers were slaughtered in Danville and the nine bulls were distributed among seven farmers.

One of the bulls was purchased by Jacob Schultz, whose farm is in Cooper township, Montour county. After this bull arrived at Mr. Schultz's farm it was noticed that it was stiff and that it lacked vigor, but it was considered that this, perhaps, was a result of the journey.

November 3rd a few cows in Mr. Schultz's herd of 40 animals showed some evidence of illness; they did not eat well, they appeared to move with difficulty and there was some excess of saliva about the lips. The next day, more cows were affected in a similar manner and those first affected showed more severe symptoms. The following day, Dr. J. O. Reed, Veterinarian of Danville, was called to see the cattle. He found that approximately half of the mem-

*"The Origin of the Recent Outbreak of Foot-and-Mouth Disease in the United States," by John R. Mohler, V. M. D., and Milton J. Rosenau, M. D., Circular No. 147, U. S. Bureau of Animal Industry.

bers of the herd were affected as described. November 6th Dr. Reed concluded that the cattle in question were affected by foot-and-mouth disease and so reported upon one of the official report-cards,* and, in the afternoon of the same day, by telephone, to the office of the State Livestock Sanitary Board, at Harrisburg. Upon the receipt of this report by telephone Dr. T. E. Munce proceeded to Danville and examined Mr. Schultz's cattle with Dr. Reed, Saturday morning, November 7th. Upon the completion of his examination he quarantined the cattle, and telephoned to me, the afternoon of the same day, a report of the condition found.

Half an hour after receiving this message I took the evening train to Sunbury and proceeded from there early Sunday morning, November 8th, to Danville. All of Mr. Schultz's cattle were carefully examined Sunday morning. It was found that most of the members of the herd, consisting of 38 cows and 2 bulls, were more or less affected. There were erosions in the mouth, upon the tongue and about the lips. Some of the erosions were of bright, red color; and others were coated with a layer of tough yellow fibrin. The cattle were salivating profusely, some of them were making with their mouths a clicking or smacking noise. Nearly all of the cattle exhibited soreness of the feet, as shown by cracking and peeling of the epiderm between the hoofs, in some cases at the top of the cleft in front of the hoofs, and in others about the heels. No vesicles were to be seen upon any of the animals at the time of this inspection. A number of cows had not eaten for several days and the milk flow of the herd diminished to about one-third of the normal amount. Most of the milk cows exhibited peeling surfaces upon the teats and udder. In some of them there was a good deal of inflammation and swelling about the opening of the teat, interfering with the milk flow. In such animals, garget had occurred and the secretion from the udders of some of the cows was thick and purulent. The temperatures of all of the members of the herd was normal or nearly so.

While no disease is known other than foot-and-mouth disease that could produce the symptoms exhibited by the various animals in this herd, the scientific evidence of foot-and-mouth disease could not be regarded as complete without the early or vesicular stage. Realizing the responsibility that rested upon me as State Veterinarian in the matter of making a diagnosis of foot-and-mouth disease—an exotic plague that was not known to exist in North America—and realizing the far reaching consequences of such a diagnosis to the cattle of the United States, when announced officially, I considered it my duty to obtain such complete evidence as to the nature of the disease as would be required to demonstrate the diagnosis scientifically. Therefore, I obtained two young cattle from another farm, where there had been no disease; one of the cattle, a heifer two years old, was inoculated by rubbing in the mouth saliva taken from the mouth of a diseased cow; the other, a heifer nine months old, was inoculated by injecting into the jugular vein about twenty drops of mixed saliva taken from the mouths of several cattle showing well marked evidence of the disease.†

*This card was delivered from the post-office at Harrisburg, November 7th.

†The result of this experiment was not required because the next day cattle were found near Watontown which presented the symptoms characteristic of all stages of the disease, and I announced the diagnosis officially before these experimental animals were again seen.

It should, however, be stated that both animals contracted foot-and-mouth disease: the first developed vesicles in the mouth after a period of incubation of four days, the second developed vesicles in the mouth forty hours after the intravenous injection.

Mr. Schultz's herd was immediately placed under stringent quarantine. The removal from the farm premises of all objects that might carry infection was prohibited. The sale of milk had been discontinued several days before, when the first evidence of illness occurred among the cattle. All outsiders were warned away and were prohibited entering the premises occupied by the infected animals.

Dr. Munce and Dr. Reed were requested to ascertain the exact time of arrival of Mr. Campbell's cattle from East Buffalo, the initials and number of the car in which they were shipped, the place of unloading, the disposition of the animals, the possibility of contact with other animals and especially, to determine the present location of all the animals remaining alive of this shipment and to quarantine them, as also all herds and premises they had entered.

Members of the permanent staff of veterinarians employed in the State service were summoned by telegraph to join me at once at Danville.

The next day, Monday, November 9th, I went to Milton in response to a notice from Dr. H. T. McNeal, to the effect that cattle belonging to Mr. Eli Yost, near McEwensville, Northumberland county, were affected by a contagious disease. Before my arrival, Dr. McNeal had decided that these animals were affected by foot-and-mouth disease, and so reported in a letter received in Harrisburg the day of my visit to him in Milton.

It was found that Mr. Yost's herd consisted of 14 cows and 2 bulls. On the 2nd of November, 1908, he had taken home to his farm from a pasture on the farm of Mr. J. M. Montgomery, two miles distant, toward Turbotville, a grade Jersey cow that had been sent to this pasture two weeks before. This cow had been in contact, in Mr. Montgomery's pasture, with cattle that Mr. Montgomery had shipped from East Buffalo, October 26th and that had arrived at his farm October 27th. Mr. Montgomery remembered that this cow, the day before she was removed, had stood alone away from the other cattle and appeared to be sluggish. Nothing abnormal was noticed in regard to the cow during the time she was being driven home excepting that she moved along very quietly and slowly. Mr. Yost's herdsman said that the cow did not eat Monday night, when she was brought home, but Mr. Yost did not observe anything unusual in relation to the animal until the next day, Tuesday, November 3rd. His attention was then drawn to the fact that the cow had some discharge from the eyes and nose and that there was considerable accumulation of saliva about the mouth. The mouth and the muzzle became rapidly more sore and the following day, Wednesday, November 4th, Dr. McNeal was called to see the cow and four other cows which exhibited the following symptoms: the temperatures ranged from 104° to 106° F.; there was an accumulation of frothy saliva about the lips, the cows smacked their lips and sucked their tongues, there was some quivering of muscles, great diminution in the milk flow and loss of appetite for both food and water. Occasionally, one of the animals would raise one of its feet in a spasmodic, jerking way and shake it two or three times before putting it down. Dr. McNeal observed vesicles in the mouth of some of these cows. During the following days, the other cattle in the herd became affected. As the

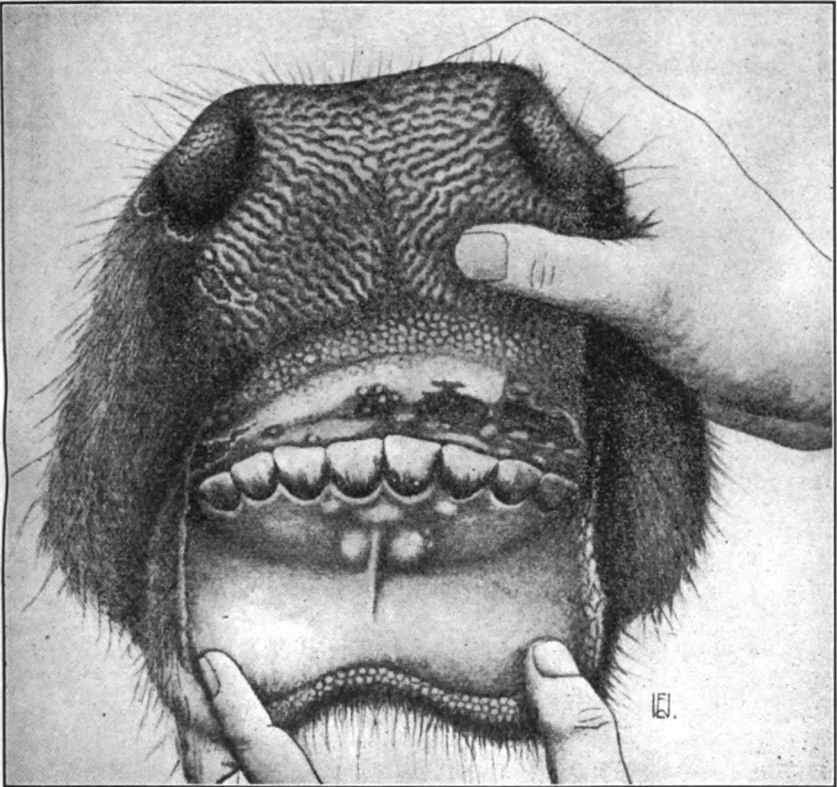


Figure 1. The mouth of a cow with aphthous fever. Note the large and small vesicles, the largest of which are below the incisor teeth; and the erosions with sharp borders and dark (red) bottoms on the border of the dental pads.—(From Hutyra and Marek).

order of development of disease in this herd is of some interest, as showing the period incubation, the facts as they were gathered will be stated. It will be remembered that the diseased cow (No. 16), was brought home Monday, November 2nd, in the evening, and was then ill. It was placed in the stable with the other cattle. The other cows were observed by the owner to become affected in the following order:

Thursday morning, ...	cow	No. 4.
Thursday noon, ...	cow	No. 5.
Thursday evening, ...	cow	No. 15.
Friday noon, ...	cow	No. 3.
Saturday morning, ...	cow	No. 8 and bull 12.
Saturday noon, ...	cow	No. 10.
Saturday evening, ...	cows	No. 2 and 7.
Sunday morning, ...	cow	No. 11.
Sunday evening, ...	bull	No. 13.
Monday morning, ...	cows	No. 1 and 9.

At the time of my visit, the temperatures of the different members of the herd were as follows:

Cow No. 1, ...	104
Cow No. 2, ...	104.5
Cow No. 3, ...	102.
Cow No. 4, ...	102.
Cow No. 5, ...	105.5
Cow No. 6, ...	105.
Cow No. 7, ...	104.
Cow No. 8, ...	102.
Cow No. 9, ...	105.5
Cow No. 10, ...	102.5
Cow No. 11, ...	101.5
Bull No. 12, ...	101.5
Bull No. 13, ...	102.5
Cow No. 14, ...	101.
Cow No. 15, ...	104.
Cow No. 16, ...	101.

The symptoms shown by Cow No. 1 were typical and were as follows: the cow was depressed; the coat was rough and staring; there was some quivering of the muscles; the animal had not eaten that morning; upon the middle of the muzzle there was a large vesicle more than an inch in diameter and raised 3-8 of an inch above the surface and extending almost from nostril to nostril. This vesicle was opened and was found to contain clear, amber-colored serum. Upon the right nostril there were two small vesicles about the size of a pea. Upon the dental pad, there was evidence of a freshly ruptured vesicle, as shown by a circular patch of scarlet color, around which hung loose shreds of epithelium. Upon the right side of the tongue there were three vesicles about one-half inch in diameter; four inches back of the tip, on the dorsum of the tongue, there was a vesicle. The mouth contained an excess of saliva, which collected as froth about the lips and descended in long strings. The feet were tender, as shown by the short, halting steps taken by the cow when

led from the stall. The skin between and about the top of the hoofs was reddened. There were no vesicles upon the feet at that time, although vesicles later formed between the hoofs and about the heels.

Mr. Yost's herd was immediately quarantined and precautions were taken similar to those that had been employed in relation to the herd of Mr. Schultz, at Danville.

From Mr. Yost's farm, I went with Dr. McNeal to the farm of Mr. J. M. Montgomery, near Turbotville, Northumberland county. It was found that Mr. Montgomery had received, October 27th, a car-load of cattle from Buffalo. These cattle were purchased at the East Buffalo stockyards Monday, October 26th, and were shipped from there in the evening in N. Y. C. car No. 23060. Of this load 32 steers and heifers were purchased from Messrs. Langdon, McCarthy and Huddleston, and 7 steers and bulls were purchased from Windsor Bros. These cattle were unloaded at Watsontown at 3 p. m.; they were driven to Mr. Montgomery's farm about three miles away, with the exception of two butcher cattle, which were killed at Watsontown. Before these cattle arrived at the farm there were on the place Mr. Yost's cows, two cows belonging to Mr. Montgomery's tenant and two native heifers. During the next few days, Mr. Montgomery sold several steers and young cattle, and, in this way, spread the disease to the farms of his customers, as will be noted later.

At the time of my visit, Mr. Montgomery had on his farm 30 cattle and 44 swine; the cattle comprised two bulls, two cows, eight heifers and eighteen steers. Nearly all of the members of the herd showed typical symptoms of foot-and-mouth disease. This herd was closely quarantined and precautions were taken to prevent the dissemination of disease to other cattle in the neighborhood.

Arrangements were at once made to find the cattle that Mr. Montgomery had sold after the arrival of the shipment from East Buffalo, and to quarantine all cattle that had been exposed to these animals.

After having seen the herds of Mr. Yost and Montgomery, in both of which were cattle exhibiting all stages of foot-and-mouth disease, there was no occasion for withholding the announcement of the official diagnosis. Therefore, as soon as the telegraph office at Milton could be reached, a message was sent to the Commissioner of Agriculture of New York State, advising him that foot-and-mouth disease had been found among cattle recently shipped through the stockyards at East Buffalo. A telegram was also sent to the Chief of the Bureau of Animal Industry of the United States Department of Agriculture to inform him of the occurrence of foot-and-mouth disease among cattle in Pennsylvania, that the source of infection appeared to be the stockyards at East Buffalo, and requested a conference with him to agree upon further measures.

MEASURES ADOPTED BY THE STATE LIVESTOCK SANITARY BOARD

Dr. P. K. Jones, agent of the State Livestock Sanitary Board, was instructed by wire to go from Pittsburg to Buffalo and there obtain all information possible in relation to cattle shipments from that place and to points in Pennsylvania, and especially to obtain a list of all shipments that had been made from East Buffalo to any place in this State from the middle of October to the time of his investigation.

The next day, a letter was prepared, which was sent to 853 veterinarians of Pennsylvania to advise them of the occurrence of foot-and-mouth disease among cattle in this State and to caution them to be on the look-out for this disease and to report anything resembling foot-and-mouth disease, by telephone or telegraph to the office of the State Veterinarian at Harrisburg. A notice was prepared and printed Tuesday, November 10th, for use in placarding premises where foot-and-mouth disease might be found. (Appendix A.) A quarantine order was also prepared for service on the owners or custodians of infected animals, herds or premises. (Appendix B.)

All of the veterinarians in the regular service of the State Livestock Sanitary Board and a number of temporary employees were engaged during the next few days in the vicinity of Danville and Watsonstown in searching for cattle sold by Messrs. Campbell and Montgomery and for cattle that had been exposed to such animals. As the work was new to most of our agents, for there has been no previous outbreak of foot-and-mouth disease in Pennsylvania,* a set of instructions to agents of the State Livestock Sanitary Board engaged in work upon the control of foot-and-mouth disease was prepared and was published November 11th, as Circular No. 14. (Appendix C.)

A meeting of the State Livestock Sanitary Board was called and was held in the office of the Governor November 13th. At this meeting resolutions were adopted as follows:

WHEREAS: Aphthous fever or foot-and-mouth disease has occurred among cattle in the counties of Montour, Northumberland and Union, and it is deemed that cattle in the county of Columbia may have been exposed, and

WHEREAS: Foot-and-mouth disease is a dangerous and highly contagious disease affecting cattle, sheep, goats and swine, and it is of very great importance to the livestock interests of the State and Nation that this outbreak shall be controlled and eradicated, and

WHEREAS: The State Livestock Sanitary Board is charged with the control of contagious diseases among domestic animals in Pennsylvania, and is authorized and empowered by the Act of May 21st, 1895, to establish, maintain, enforce and regulate such quarantine and other measures relating to the movements of animals and their products as may be necessary for carrying out the purposes of the said Act, therefore

IT IS HEREBY ORDERED, FIRST: To prevent the spread of foot-and-mouth disease, and to aid in its eradication, no cattle, sheep, goats or swine shall be moved from or out of the counties of Columbia, Montour, Northumberland and Union.

SECOND: No cattle, sheep, goats or swine shall be moved into any one of the counties of Columbia, Montour, Northumberland or Union except for immediate slaughter.

All transportation companies, cattle dealers, farmers and others are called upon to assist the State Livestock Sanitary Board in the enforcement of the foregoing order of quarantine so that this outbreak of disease may be eradicated with the least possible loss and in the shortest possible time.

*It should be stated here that while the work was new to most of our inspectors, they all showed splendid adaptability and capability from the beginning. Almost at once they worked with

RESOLVED: That the State Veterinarian is hereby authorized to request and accept the co-operation of the Chief of the Bureau of Animal Industry in the work of prevention, suppression, control and eradication of foot-and-mouth disease in Pennsylvania, in accordance with such a plan and upon such terms as will contribute to the scope and efficiency of the work of this Board.

RESOLVED: That the Secretary of the State Livestock Sanitary Board is hereby authorized to appoint as agents of this Board such employes of the United States Bureau of Animal Industry engaged in the control of diseases of animals in Pennsylvania as are recommended for such appointments by the Chief of the Bureau of Animal Industry: Provided, however, that employes of the United States Bureau of Animal Industry appointed as agents of the State Livestock Sanitary Board shall receive no compensation from the State funds for service as agents of this Board.

RESOLVED: That the Secretary of this Board is hereby authorized to purchase such supplies and materials and to employ such agents as may be necessary to carry out the provisions of the Act of May 21st, 1895: Provided, that the expense incurred shall not exceed the amount of money now available for such purposes.

The following rules and regulations were also adopted by the State Livestock Sanitary Board:

The State Veterinarian, the Deputy State Veterinarian and the agents of the Board, under the direction of the State Veterinarian, are authorized to carry the following rules and regulations into effect:

Upon the discovery of foot-and-mouth disease, it is required that a quarantine shall at once be established of the affected animals and of all cattle, sheep, goats and swine that it is believed may have been exposed. Premises or objects occupied or contaminated by affected animals or their products must be quarantined, and premises may be quarantined where there is reason to believe that there may be danger of contamination by foot-and-mouth disease.

1. Cattle, sheep and goats and swine under quarantine on account of foot-and-mouth disease must be kept absolutely and wholly separate and apart from all other animals and all other animals must be kept wholly apart from quarantined animals.

2. The quarantine is extended to animals other than those originally quarantined, if they are permitted to come in contact with quarantined animals or to enter quarantined premises.

3. Persons caring for animals quarantined on account of foot-and-mouth disease must not, under any circumstances, come in contact, either direct or indirect, with other cattle, sheep, goats or swine.

4. No animals shall be allowed to run loose, or to go free on or near quarantined premises. This regulation covers domesticated animals of all kinds, including dogs, cats and poultry.

5. If there are pigeons on a farm or on premises quarantined on account of foot-and-mouth disease the pigeons shall be killed or they shall be confined on the said quarantined premises until released by authority of an agent of the State Livestock Sanitary Board.

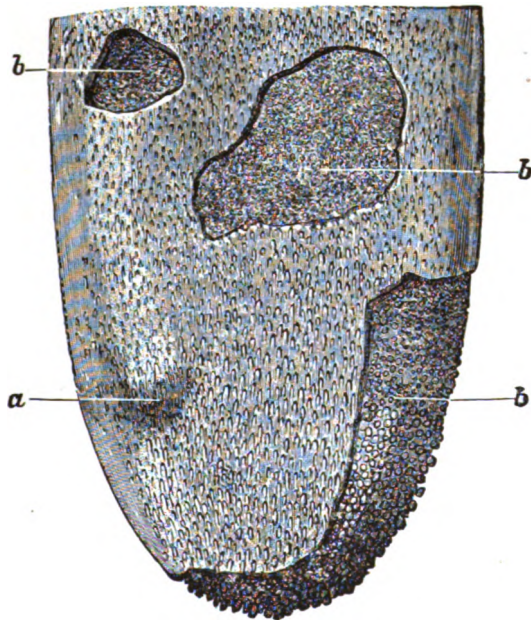


Figure 2. The tongue of a cow with aphthous fever. *a*. A vesicle, consisting of a collection of serum beneath the epithelial layer of the mucous membrane (as a blister). *b.b.b.* Erosions, which have resulted from the tearing away of loosened epithelial layers covering vesicles that occupied these sites. Note the abrupt, sharp borders of the erosions, and the fact that the horny spines of the dorsum of the tongue are lost where the erosions have occurred. (From Ostertag).

6. If domesticated animals, dogs, cats, poultry or pigeons are kept at liberty or are allowed to go free so near quarantined animals or premises they constitute, in the estimation of an agent of the State Livestock Sanitary Board, a menace to the efficiency of the quarantine, such animals may be confined and placed under quarantine.

7. Milk from diseased or exposed cows or milk produced in or on quarantined premises shall be placed in milk cans, or other receptacles that have covers that fit tightly. Formaldehyde shall be added to such milk in the proportion of one pint of formaldehyde to thirty quarts of milk. The cover shall then be placed on the can or receptacle and the milk and formaldehyde mixture shall remain in the cow stable, undisturbed, for not less than eight hours, after which it is to be poured into a pit dug in the manure pile and covered over with manure. Agents of the State Livestock Sanitary Board may authorize other safe methods for disposing of such milk.

8. There shall not be removed from quarantined premises, without specific permission in writing from an authorized representative of the State Livestock Sanitary Board, any material, article or thing that is likely to or that may convey contagion, and, in particular, there shall not be removed from such premises any milk or milk products; diseased, exposed or quarantined animals, hay, straw, fodder, grain or other feed, manure, stable or milk utensils.

9. Horses that are to be used must be kept in a stable separate from the buildings and premises under quarantine. Before removal to such stable the horses shall be thoroughly cleaned, their feet and legs shall be disinfected and the halters and harness shall be disinfected.

10. Persons caring for quarantined animals must not convey or permit the conveyance, from the quarantined premises, of articles, materials or things that have been in contact with, that are contaminated by or that may have been contaminated by diseased animals.

11. All unauthorized persons are forbidden to enter quarantined premises or to come in contact with diseased or exposed animals, or with any object or thing that may have been contaminated by or from such animals.

WHEREAS: The occurrence of foot-and-mouth disease among domestic animals in Pennsylvania, constitutes an emergency that will necessitate unusual expenditures by the State Livestock Sanitary Board, be it

RESOLVED: That the Auditor General and the State Treasurer are requested to make available for immediate use such funds appropriated to the State Livestock Sanitary Board as may properly be employed in the control of this disease.

A quarantine order was issued forbidding the removal of cattle, sheep, goats or swine from or out of the counties of Montour, Northumberland and Union and against the movement of cattle, sheep, goats or swine into the said counties excepting for immediate slaughter. (Appendix D.)

An office was opened in the Montour House in Danville for the administration of the work in that district. At Harrisburg, the office of the State Veterinarian was kept open from 7 a. m. to 12 p. m., for the receipt of messages and reports and for the dissemination of orders and information to agents of the State Livestock Sanitary Board and to veterinarians and cattle shippers.

Wednesday, November 11th, Dr. A. D. Melvin, Chief of the Bureau of Animal Industry, arrived at Danville, accompanied by Dr. J. R. Mohler, Chief of the Division of Pathology, and Dr. R. P. Steddom, Chief of the Inspection Division. Preliminary arrangements were made whereby the United States Bureau of Animal Industry should co-operate with and assist the State Livestock Sanitary Board. Dr. Melvin telegraphed instructions to a number of the veterinary inspectors of the Bureau of Animal Industry to repair to Danville. Dr. Samuel E. Bennett, Chief Inspector at Chicago, was selected to remain in local charge of the federal inspectors; he arrived in Danville November 13th. Dr. Melvin proceeded from Danville to Buffalo, New York, and returned from Buffalo to Sunbury November 15th. At a conference held that day it was arranged that Dr. Bennett should represent Dr. Melvin and his Department in work pertaining to the eradication of foot-and-mouth disease in Pennsylvania, and that the United States Department of Agriculture should bear two-thirds of the total cost of expense incurred in connection with the appraisal, destruction and burial of diseased or exposed animals and two-thirds of the cost of cleaning and disinfecting the premises contaminated by animals afflicted with foot-and-mouth disease. Furthermore, it was agreed that the veterinary inspectors of the Bureau of Animal Industry operating in Pennsylvania, shall be appointed temporary agents of the State Livestock Sanitary Board, so that they might have authority to enter premises to inspect, appraise and destroy animals, and that the federal inspectors should report to, and be subject to the regulations of the State Livestock Sanitary Board. When these arrangements were made, the work of destroying and burying affected herds and of disinfecting premises that they had occupied, was started.

THE STAMPING-OUT METHOD

The stamping-out method of dealing with this outbreak was decided upon and was recommended by me as soon as the diagnosis was established, but on account of the large amount of money that would be required, the practical work of destroying the infected herds did not begin until we had assurance as to the proportion of expense that would be assumed by the United States Department of Agriculture. There was no hesitation on the part of the federal officials in adopting this method, for the plan of operation was essentially the same as that which had given such thoroughly good results in the eradication of foot-and-mouth disease in New England in 1902-03, and is the plan that was placed in operation at that time by Dr. D. E. Salmon, then Chief of the Bureau of Animal Industry.

The stamping out method for dealing with foot-and-mouth disease had its origin in Denmark and has been used to a considerable extent in England and other countries where it has appeared to be possible, on account of the limited prevalence of foot-and-mouth disease, as at the beginning of an outbreak, to control it by this method. This method has never been attempted after foot-and-mouth disease has



Figure 3. The head of a cow with aphthous fever.

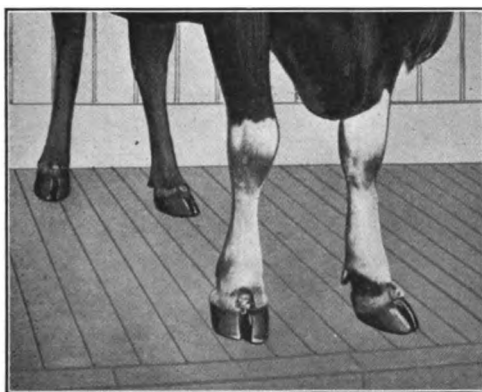


Figure 4. The feet of a cow with aphthous fever. Note the swelling about the coronary band and the eruption above the cleft separating the hoofs. (Drawn from a photograph.)

gained an extensive foothold in a country, on account of the enormous cost of compensating owners of condemned cattle; but the experience of European countries that have endeavored to control this disease by quarantine and disinfection alone, without the complete and immediate eradication of all infected places, has shown the great risk that attends this latter method, and the hopelessness of it, excepting where quarantine restriction can be enforced with the utmost severity and for long periods of time. There is now no doubt in the minds of those who have studied veterinary sanitary problems as to the wisdom of fighting outbreaks of foot-and-mouth disease by the stamping out process when the disease is of limited distribution in a country. The Chief of the Bureau of Animal Industry and his associates all agreed as to the propriety of using this method. They did not, however, as a result of the experience in New England in 1902-3, consider it necessary to purchase and own all of the coarse forage, hay and straw on infected premises.

As a result of the letter that was mailed to veterinarians November 11th, and of a circular letter to veterinarians and farmers that followed it, and the wide newspaper publicity given to the outbreak of foot-and-mouth disease in Montour and Northumberland counties, veterinarians and farmers throughout the State were all looking carefully for the first evidence of the malady. In quick succession, reports of animals or herds infected by foot-and-mouth disease, came to the office of the State Veterinarian at Harrisburg from upper and lower Lehigh county and from Lancaster, Montgomery, Chester, Delaware, Snyder and Clinton counties. Infected animals were also found in counties near the above named, as: Juniata, Lycoming, York, Union, Philadelphia and Dauphin. In every outbreak, the infection was traced, without a break in the evidence, to cattle shipped from East Buffalo.

There was very little extension of foot-and-mouth disease from herds infected within the State. It should be understood that the disease did not start at Danville and from that place spread to other parts of Pennsylvania; on the contrary, the disease was dropped down from Buffalo into eight separate and distinct districts in different parts of the State. There was no spread of foot-and-mouth disease from one general region to another within the State, and there was very little spread within a local district after the fact of infection in that district became known.

Whenever a herd was found to be infected with foot-and-mouth disease, the first step was to quarantine the herd and the premises by the service of a State Order of Quarantine, after which inquiry was at once made as to the source of infection. In all but a very few cases, which are shown in the detailed statement that follows, it was found that infection had been brought to the herd either by cattle shipped from East Buffalo or by cattle that had been in association with such animals, or that had occupied premises contaminated by such animals. In one instance, in Clinton county, the disease was carried by infected swine which, in turn, were infected by cattle from East Buffalo. In five instances, the disease was carried on the clothing of persons, and in four instances the mode of infection was not determined, although, in each of these, infected animals had been a short time before in the immediate neighborhood.

In addition to inquiring into the source of infection, a thorough investigation was always made to determine whether any animals or any products that might convey infection had been removed from the farm after the occurrence of disease upon it. When it was found that infection was brought to the farm by certain animals purchased, the seller's herd was placed in quarantine and the animals that had been distributed by this individual were traced. In most instances this was comparatively an easy task, as, for example, in the case of the nine bulls brought from East Buffalo and sold by Mr. Campbell. In this instance, it was found that seven herds were infected directly and one indirectly by this shipment. In other cases, the task was not so simple, as, for example, in relation to a shipment of 35 cattle from East Buffalo November 2nd, to Lehigh county by A. J. Bean. These cattle were unloaded at Vera Cruz, November 4th; they were driven three miles over the public highway to Limeport, where they were sold November 6th to sixteen farmers and two butchers. Nine herds became infected by these cattle. The herds of seven purchasers were not infected and two lots of cattle were butchered in apparent sound condition.

In the case of the cattle brought from East Buffalo that were sold by Ivans C. Walker, Norristown, the condition is somewhat more complicated. These cattle, 22 cows and 4 calves, arrived in Norristown November 4th and were held on Mr. Walker's premises until November 11th, when they were disposed of by public sale. During this time, the cattle were not in normal condition and they were examined by Dr. H. O. Dengler, a practising veterinarian in Norristown. Dr. Dengler observed that a number of them had abnormally high temperatures and were not well. When these animals were sold November 11th, they were associated with twenty other cattle and six goats. Nearly all of the animals disposed of at this sale carried the infection of foot-and-mouth disease from Mr. Walker's stable to other premises. This fact, however, did not become known to the authorities until November 19th, when foot-and-mouth disease was reported by Dr. Mathues in the herd of Ellis Brous near Tanguay, Delaware county, which was found to have become infected (by way of the Kelly farm), by cattle sold by Mr. Walker. In the meantime, on November 18th, Mr. Walker had held another sale and had distributed 49 cattle. These cattle were handled through his undisinfected pens, stalls and stable, and many of them subsequently developed foot-and-mouth disease. Through these sales, infection was carried directly to fifteen herds and indirectly to twelve other herds. All of the infection of foot-and-mouth disease that was distributed in Montgomery, Chester, Delaware and Philadelphia counties was disseminated from Mr. Walker's premises in Norristown, Montgomery county.

It is most unfortunate that the fact that the cows from East Buffalo were infected by foot-and-mouth disease was not made known during the six or seven days they were in Mr. Walker's cutsody. As a result of failure to discover or to report that these cattle were so affected, it became necessary to place quarantine restrictions on three counties that, otherwise, it would not have been necessary to quarantine. These four counties with which infection was carried by this shipment comprise 14,811 farms, every one of which was subjected

to burdensome restrictions, the necessity for which should have been avoided. An extensive cattle business in these counties was suspended and, for a time, destroyed. Twenty-five farmers and cattle owners lost their herds and a number were temporarily without means of earning a livelihood. Expense to the Federal and State governments amounting to tens of thousands of dollars was incurred, and the authorities were subjected to a great amount of worry and stress, all through failure to recognize the existence of foot-and-mouth disease in these animals that were under observation for a week at Norristown.

There is no occasion in Pennsylvania for a veterinarian to remain in doubt or to take individual responsibility in relation to the diagnosis of a new, strange or vague disease. It is always possible, in such cases, through the State Livestock Sanitary Board, to obtain counsel and assistance without cost, and promptly. If it had been reported to the proper authorities before these cattle were sold and distributed, that they had foot-and-mouth disease, direct and indirect losses, the amount of which it is impossible to estimate with accuracy, but which probably amounted to \$250,000, might have been avoided. This incident illustrates, and emphasizes, the grave responsibility of veterinarians in dealing with unfamiliar conditions and the care that it is necessary that they shall exercise in relation to handling diseases that they do not understand, and that may be contagious.

The first report of foot-and-mouth disease in Clinton county was found by Dr. Good among cattle belonging to Mr. R. M. Hanna, near Lock Haven. Adjoining Mr. Hanna's premises, there is a slaughter house belonging to F. L. Winner, that is used almost exclusively for the slaughter of cattle shipped from East Buffalo. Between the 19th of October and the 9th of November, 103 cattle shipped through East Buffalo, many of them from Michigan, had been killed at this slaughter house. When the slaughter house was visited it was found that there were eighty hogs on the premises and about thirty showed marked evidence of foot-and-mouth disease. It appeared to be probable that the infection was in some way carried from the slaughter house premises to the adjoining premises of Mr. Hanna, although the exact mode of transmission was not determined. From the premises of the slaughter house of Mr. Winner and from Mr. Hanna's farm, the infection was carried to three other farms in the neighborhood.

The outbreak of foot-and-mouth disease that occurred in Snyder county and the disease that extended into the neighboring counties of Juniata and Dauphin resulted from two shipments of cattle from East Buffalo, N. Y., to Wm. Troutman, of Meiserville. Mr. Troutman shipped 33 cattle from East Buffalo November 2nd, and he shipped 26 cattle November 9th. These lots of cattle arrived at Middleburg November 3rd and November 9th, respectively. The first lot of cattle, after being unloaded at the railroad platform and chute in Middleburg, was taken to the pasture of W. Kuster, adjoining Middleburg. These cattle may have been diseased at the time of unloading, or they may not yet have developed symptoms; the evidence of this point is not clear. Some of this lot of cattle were sold to five farmers and others were taken to Mr. Troutman's farm in Chapman township. The farms of three of the purchasers of these cattle are just across the line of Snyder county, in the northern part of Juniata

county. One of these purchases resulted in the infection of a herd in addition to that of the original purchaser and another purchase (Bower), resulted in the infection of one other herd of two cows on other premises. The second lot of cattle shipped from East Buffalo by Mr. Troutman (shipment of November 9th), probably arrived in Middleburg in sound condition. None of these animals was observed to be affected with foot-and-mouth disease until nearly a week after their arrival in Middleburg. The cattle may have been exposed at the stockyards at East Buffalo, or they may have been exposed at the unloading chute in Middleburg, or upon the pasture field of Mr. Kuster, which had been occupied over night by the lot of November 3rd. A part of these cattle were sold to five purchasers and some were retained on Mr. Troutman's farm. The cattle sold carried infection in every instance, but the disease did not spread beyond the herds infected by the purchased animals.

The herds in which foot-and-mouth disease occurred in Lancaster county appear to have been infected by cattle brought from the Lancaster stockyards. Fortunately, most of the cattle sold at Lancaster come from the West by the way of Pittsburg, where there was no infection, and it appears from the evidence available that only a few pens at the Lancaster stockyards at any time contained diseased cattle. Between the 19th of October and the 10th of November, shipments of cattle were received from East Buffalo at the Lancaster stockyards by four commission men. Many of these cattle came from Michigan, by way of the Detroit stockyards. Some were from infected counties in Michigan. It happened that these four commission men sold cattle to go into all of the herds that were originally infected in Lancaster county. Infection was carried to three herds in Lancaster county by means that could not be definitely traced; one of these three herds was on a farm only a mile and a half from the stockyards, and alongside of the railroad; the others were a mile away, across country from this one. It appears that seven herds became infected by animals purchased at the stockyards. Only one lot of cattle distributed infection outside of the stockyards beyond the premises first infected, and this spread infection to six herds.

As the amount of infection at the Lancaster stockyards could not at once be determined, it was deemed advisable to thoroughly clean and disinfect the entire yards. The work of cleaning and disinfecting was commenced November 23rd and occupied two weeks. The work was very thoroughly done by the stockyard company. In order to expedite the work, the first supply of disinfectants was furnished by the State Livestock Sanitary Board, but the material and labor to complete the work were supplied by the stockyard company. In order that the work might be started promptly, a steam disinfectant pump belonging to the State was loaned to the stockyard company, and was used for several days until it was replaced by a larger pump supplied by the company. The cleaning of the stockyards preparatory to disinfection was very thorough and cost about \$7,000.00, exclusive of loss of business.

The Lancaster stockyards are equipped to handle 6,000 cattle at one time. There are more than 200 pens. Most of these pens are located on the north side of the Pennsylvania railroad. There are many streets and alleyways through the stockyards and three scales, with pens adjoining. There are also buildings for the storage of hay and straw, a corn crib, a two horse stable and a two-story



Figure 5. A cow with aphthous fever or foot-and-mouth disease.

cow stable and several fine buildings. On the south side of the railroad tracks, there are other pens and alleyways. The two sets of pens are connected by a tunnel beneath the railroad tracks. There are long unloading platforms sufficient to accommodate two trains on each side of the railroad. At the west of the yards, on the north side of the railroad, there is a series of pens for sheep and hogs. Most of the pens in the Lancaster stockyards are partly covered with shed roofs. The uncovered portions of some of the pens are paved. Most of the streets and alleyways are paved with brick or stone.

In cleaning the stockyards, all manure was removed; this was piled up on a plot of ground outside of the stockyards and east of it. The manure was mixed with chloride of lime as it was piled. Afterwards, the mangers and racks were cleaned and the ground was scraped with shovels and hoes. In many places, the covering of the earthen floors was removed with picks. All of this material was shoveled into carts and was piled with the manure. The fences, feeding troughs and the floors of the pens and of the streets and alleyways were thoroughly swept. Accumulations of manure and dirt on the posts, fences, etc., were scraped off.

After this thorough cleaning, the premises were disinfected. The disinfectant solution used was carbolated lime wash—a thin white-wash, to which was added sufficient “straw-colored carbolic acid,” (cresol), to make a five per cent. solution. The distribution of this material was accomplished by the use of pumps. In the beginning hand pumps were used but it soon became evident that it would not be possible, without a very great, and avoidable expenditure of labor and time, to complete the work in this way, therefore, I devised a plan for distributing the disinfectant more rapidly with a steam pump. I had a small steam pump mounted on a low hand truck; this was connected by steam hose with the boiler of a traction engine. Two lines of hose, each 120 feet long, led from the steam pump. The pump was fed from a cask containing the disinfectant solution. From two to three barrels of solution were required for each cattle pen. The solution was conveyed to every portion of the surface of the fences and fittings of the pens; it was also carried into cracks and crevices between boards and was in amount sufficient to thoroughly drench and wet every exposed surface. This pump was afterward replaced by a larger pump that supplied three lines of hose.

There was, at first, some difficulty in mixing the disinfectant fast enough to keep the pump supplied. A very successful plan for accomplishing this was worked out by Dr. W. G. Benner. He arranged for the construction of an elevated vat in which the lime wash and carbolic acid could be mixed. The mixture was drawn from this vat into a tank on a wagon, which was taken to the place where the disinfection was going on, and the mixture was pumped from the tank wagon. While one wagon was being emptied another was being filled. In this way, the pump was kept continually supplied, with the expenditure of a minimum amount of labor.

After the stockyards had been cleaned and disinfected, they were reopened for business. Under the restrictions established by the Secretary of the United States Department of Agriculture with relation to stockyards in quarantined states carrying on interstate trade, it was provided that the stockyards should receive no local cattle, but only such cattle originated from unquarantined territory in this or other states and that had been shipped in disinfected cars.

METHOD OF DEALING WITH THE HERD

The method of dealing with a herd in which foot-and-mouth disease had been found was as follows: The herd was immediately placed in quarantine by serving upon the owner or custodian a properly executed State quarantine blank, as shown by Appendix B. The premises were then placarded by tacking to gates, doors and walls a warning notice, as shown by Appendix A. The farmer was instructed as to the nature and the necessity for the severe precautions that were ordered. The custodian of the cattle was required to keep a set of overalls and rubber shoes to wear while among the cattle and to leave this clothing at the door or gate leading from the infected premises, and to wash his hands with a disinfectant. If horses had been kept in the same building with cattle it was required that those that were to be used on the road should be taken out and stabled elsewhere. Usually it was possible to build temporary stalls in a wagon shed or in some other building entirely apart from that occupied by the cattle. Before the horses and their harness were permitted to be moved from the infected premises to their new quarters, it was required that they should be cleaned and disinfected under the supervision of a State or Federal inspector. Persons who came in contact with the infected animals or infected premises were not permitted to leave the farm until after they had bathed and changed their clothing, or until after the clothing that they had worn among the cattle had been disinfected by immersion in a solution of bichloride of mercury, or by fumigation with formaldehyde.

Immediate arrangements were made for the appraisal of all infected and exposed animals. In many instances, the appraisals were made by an agent of the State Livestock Sanitary Board and a veterinary inspector of the Bureau of Animal Industry, in agreement with the owner. In those cases, however, where this could be done without serious loss of time, or where there was difficulty in reaching an agreement that was believed to be equitable, an official appraiser was appointed. An effort was made in every case to arrive at the actual market value of the appraised animals. All of the exposed cattle on the farm were appraised, whether they exhibited symptoms of foot-and-mouth disease or not. The same rule was adopted with regard to sheep and goats. In respect to hogs, it was arranged that if these had been in contact with cattle, in the barnyard or elsewhere, that they should be appraised and destroyed and buried with the cattle. If, however, the hogs were kept in a separate building and had not been in contact with the cattle or with the premises that the cattle occupied but had been exposed only by the passage of people between the piggery and the cow stable, and if all the hogs were free from evidence of foot-and-mouth disease, permission was given to slaughter the hogs on the farm and to use the meat, after the head and feet had been removed. It was considered that if the head and feet were removed and the surface of the hog was thoroughly cleaned by scalding, that there could be no possibility of the transfer of infection, and no harm resulted in any case from this practice. It should be stated, that permission to dispose of hogs in this way was not made use of excepting in a few instances, and then only to obtain pork for local consumption. In nearly every case the hogs were killed with the cattle.

Instructions were given to the agents of the State Livestock Sanitary Board, and similar instructions were given by Dr. Bennett to the veterinary inspectors of the Bureau of Animal Industry acting under temporary appointment as agents of the State Livestock Sanitary Board, to arrange, as soon as foot-and-mouth disease was diagnosed, for the excavation of a trench in which to bury the condemned animals. An effort was made to locate the trench near the stable and on the same side of the road. Usually the location was within one hundred yards of the cow stable. The trenches were dug seven feet wide and seven feet deep, and long enough to accommodate all the animals to be buried, allowing from eighteen to twenty-four inches in length for each animal, depending upon their size. For a herd of thirty cattle of varying sizes a trench of fifty feet long would probably be sufficient.

In destroying the cattle, they were usually led to the side of the trench, where they were shot and rolled into the trench, and then bled. The abdomen was opened and the contents of the paunch was drawn out, in order that the carcasses might be stored more compactly. Hides were slashed, to spoil them. An effort was made to have but one layer of animals in the bottom of the trench. Small animals were deposited in the spaces between the larger ones.

It was unsafe to attempt to lead some animals that were cross or were not accustomed to being handled. Such animals were shot in the stable and were drawn out by horses, or they were led out behind a wagon. After the killed animals were all in the trench, they were covered with freshly burned lime. From two to three bushels of lime was allowed for each carcass.

The laborers engaged in this work were supplied with overalls and caps, which were afterwards thrown into the trench and covered over. Their shoes were disinfected. The other clothing was fumigated on the wearer, under a fumigation cape. The trail over which the cattle were led from the stable to the trenches was, in some instances, burned over after it had been sprinkled with kerosene and strewn with straw. If this could not be done, the trail was scraped and the earth was thrown into the trench, or it was thoroughly sprinkled with disinfectant, or was spread over with lime.

DEALING WITH THE INFECTED PREMISES

After the animals were destroyed, the infected premises were closed until they could be reached by the disinfectors. The work of cleaning preparatory to disinfection was organized by Dr. Bennett, whose method was based on the experience he had during the outbreak of foot-and-mouth disease in New England in 1902-3. Some of the disinfecting corps were in charge of State and others were in charge of federal employees. Preliminary to disinfecting premises that had been occupied by animals affected with foot-and-mouth disease, the manure in the yard and stable was brought together and piled. As it was turned over, it was heavily sprayed with a solution of formaldehyde, cresol or chloride of lime. The stable was thoroughly cleaned out. This necessitated the removal of such interior fittings as mangers, hay racks, stall partitions and floors of wood or loose material.

The woodwork that was not removed was well cleaned by scrubbing and scraping. Most of the stables had hay lofts or hay mows, the floors of which constituted the ceiling of the stable. In some cases, although rarely, these ceilings were made of well joined tongued-and-grooved boards. Usually, they were made of boards laid loosely, with spaces between, and sometimes of poles between which hay projected and hung down into the stable.

The tops of the hay mows were thrown off and the sides were raked or cut down, thus removing all of the loose and possibly contaminated exterior. All wood, hay, etc., removed was burned. Where hay projected through the floor of the mow, the loose hay was pulled out with hooks and later, in some cases, formaldehyde solution was pumped into the exposed hay or straw by inserting the nozzle of the hose through the crevices between the boards or poles into the mass of hay or straw lying at the bottom of the mow.

After cleaning, disinfecting was accomplished by the liberal use of formaldehyde solution (5 per cent.), cresol solution (3 per cent.), or carbolic acid solution (5 per cent.) In some cases chloride of lime was used for part of the work. It was customary to add the formaldehyde or carbolic acid to whitewash. This is good practice because the disinfectant shows where it has been applied, and there is no danger that any part of the surface that should be reached by the disinfectant may escape. Saponified creosol cannot be used in this way with lime. On account of the large amount of mixture that is required to disinfect some places (1,000 to 2,000 gallons), it was difficult to do the work easily when only hand pumps were used. Therefore, I equipped and placed in use three steam pumps which were found to be of great advantage, when properly handled.

It was recognized that steam pumps would need skillful attention and so a careful man was selected to take charge of each one. A steam pump is not a practical disinfection apparatus if it is in the hands of an incompetent or careless person as the mechanism may fall into disrepair, or the boiler may be injured, and so delay the work. This, however, did not occur in relation to any one of our steam pumps. We found that the most convenient way of working the steam pump was to have it mounted on a small hand truck and to use it in connection with a traction engine, as was done at the Lancaster stockyards. This obviates the movement of a heavy truck from one part of the State to another. It is possible to hire a suitable traction engine, by the day, in almost any farming community. The pumps were provided with two outlet pipes so that each could supply two lines of hose. With such equipment, the rapidity with which the work of disinfection was carried on was measured only by the ability of the helpers to supply the disinfectant mixture.

An advantage of a steam pump over a power pump operated by a gasoline engine is that exhaust steam can be used for heating and keeping hot the disinfectant solution, thus making it much more efficient in cold weather.

After having disinfected the manure pile, the stable and the barn surroundings were disinfected, as well as the outside of the building to a height of about eight feet, the barnyard walls, fences and the near-by paths and ground surfaces over which cattle and people had walked.



Figure 3. The examination of the mouth and tongue of a cow with aphthous fever.

Formaldehyde gas was used for disinfection in some places, and it is believed to be very suitable except for the danger by fire, when the gas is liberated by the use of permanganate of potash. In fumigating a stable, it is necessary to close it as tightly as possible to prevent the waste and escape of gas. This can be done effectively, and relatively cheaply, by using a billposter's equipment and by pasting wide strips of paper around windows, doors and other cracks and openings. The entire outside of the building may thus be prepared. In fumigating stables with formaldehyde, care is taken to dampen the interior by spraying with water, as the formaldehyde gas is of very limited value. About 50 per cent. of material is used in excess of the normal amount of 20 ounces of formaldehyde solution and 16 2-3 ounces of permanganate of potash to each 1,000 cubic feet of air space.

Three hand pumps were supplied by the State for disinfection purposes, for use in places that were not readily accessible and to which it would not pay to ship or move a steam pump. The Bureau of Animal Industry had in use some hand pumps and, later, two steam pumps.

Considerable hay, straw and corn fodder were burned. This was always done where the conditions were such as to denote that these materials might have become infected and where they were piled or stored that the possibly infected portion could not be entirely removed. In one case, diseased cattle had been permitted to run in the corn field and to eat from and upset the bundles and shocks of corn fodder. It thus became necessary to burn the fodder in the field as well as several loads that had been taken into the barn.

The hay, straw, corn fodder, stable fittings or other material that it was necessary to destroy were appraised at market prices and an estimate was made as to the cost of labor necessary to replace the stalls, mangers, floors and other stable fittings that had been taken out. It was intended to allow reasonable and proper compensation, sufficient in amount to pay for the material destroyed and to restore the premises to the condition they were in.

The amount of material torn out of stable was large because an effort was made to be entirely on the safe side and to do all possible to completely and quickly destroy infection. If the premises had been kept idle several months, so much removal of lumber, fittings, etc., would not have been required. It was, however, considered to be desirable not only to promptly eradicate contagion but also to restore the use of the premises to the owner as soon as possible. From the standpoint of disinfection, the same result could have been reached at less expense to the State if the premises had been kept in quarantine for a longer period of time, but this would have been an additional hardship to the owner. Therefore, in those cases where the co-operation of the owners was obtained, the stables were thoroughly torn out, damages paid and re-stocking permitted six weeks after disinfection.

As has been stated, eight separate outbreaks of foot-and-mouth disease in Pennsylvania were first reported by local veterinarians to the State Veterinarian at Harrisburg, and the infected herds and premises of these outbreaks were found by State or Federal inspectors who, in consequence of information received by the State

Veterinarian, were sent into districts where infection had occurred and who then searched for animals that had been sold by the dealers who had shipped infected or exposed cattle from East Buffalo, and for other cattle that had been in contact with these.

The veterinarians of the State cannot be too highly commended for their skill in promptly recognizing this new and strange disease, and for their fidelity in making reports. There was but one instance of failure in these respects.

The precautions taken by veterinarians to avoid conveying infection when examining herds for foot-and-mouth disease are shown in Appendix C. In addition to the disinfection of rubber clothing as described on page 4 of this appendix, the practice was adopted upon the initiative of Dr. Bennett, to fumigate the clothing under a fumigation cape. For this purpose, a long rubber cape was used. The garment was long enough to reach from the neck to the floor. The opening for the head was provided with a drawing string which was tightly drawn about the neck so that after the cape was donned only the head was visible. About two ounces of formalin was placed in a little dish which stood on the floor or ground between the feet; an ounce and a half of permanganate of potash was then dropped into the dish, and the formaldehyde gas that was liberated arose and surrounded the body of the person. The period of exposure was from five to ten minutes. Fumigation was not generally practiced excepting when inspectors had been in contact with animals affected with foot-and-mouth disease, or were working in a neighborhood near an infected farm. The disinfection of rubber clothing by sponging with a solution of bichloride of mercury was, however, practiced after each inspection, whether the disease was found or not. There was no suspicion in any case that disease had been carried by any one of the State or Federal inspectors.

In examining herds for foot-and-mouth disease, inspectors were instructed to handle and to look into the mouths and examine the feet of all cattle, unless the animals were so wild as to make this impracticable.

Early in the work, even before all the known infected herds had been disposed of, and while the animals that had been associated with affected animals were being located and quarantined, attention was also given to tracing those animals that it was thought might possibly have been exposed, from the fact that they had been through the stockyards at East Buffalo, Lancaster or elsewhere where infected animals had been. Indeed, one of the first steps taken was to locate and examine cattle that had come from East Buffalo to Pennsylvania, of which there were nearly 300 carloads, from the middle of October to the closing of the Buffalo stockyards. Upon receiving from Dr. Jones the list of shipments of cattle from East Buffalo to Pennsylvania, veterinarians in districts where these cattle had gone were communicated with by telegraph, telephone or letter, and were instructed to ascertain the present location and condition of the animals. A large part of these cattle from East Buffalo had been slaughtered; others had been sold and widely distributed. Some had been sold more than once, by persons who kept imperfect records, and were, therefore, difficult to trace. Several weeks were required to locate or account for these cattle.

TRACING OF THE DISEASE

After the discovery of infection in Lancaster county, and that infected cattle had come from the local stockyards, it seemed to me that it was desirable, and as promptly as possible, to trace all of the cattle that had been sold from the Lancaster stockyards during the five weeks from October 19th to November 23rd, when the stockyards were closed. To facilitate this work, I obtained lists of sales from all of the commission men at the Lancaster stockyards. The record of each lot of cattle sold was copied from these lists on to a card, which then furnished the name and address of the purchaser, the number of cattle purchased, the date of purchase and the name of the seller. These cards were classified by districts. A package of cards bearing records of all of the cattle sold from the stockyards to a certain district during the period of five weeks was then given to an inspector, whose duty it was to locate and examine the other cattle on the farms to which they had gone.

Before these inspections of shipments from Buffalo and Lancaster were finished; veterinary inspectors were assigned districts in which they were to examine all of the cattle, sheep, goats and swine on all of the farms. The magnitude of this part of the work will be realized when it is stated that there are more than 50,000 farms in the counties in which foot-and-mouth disease appeared. However, many of these farms are quite remote from localities where foot-and-mouth disease occurred, and it was not important to examine the cattle on all such farms. In order, however, that every place where infection might have gone should be investigated, it was decided to examine the cattle in localities comprising about 40,000 farms.

INSPECTION AND QUARANTINE

Most of this particular part of the work; that is, the farm-to-farm inspection was conducted by veterinary inspectors of the Bureau of Animal Industry. All of these inspections, whether made by veterinarians in State or Federal employ, were reported in duplicate, one copy of the report being sent to the office of the State Veterinarian, the other to the Bureau of Animal Industry. The report blank used for these inspections is shown in Appendix E.

While veterinarians employed by the State Livestock Sanitary Board were engaged in farm-to-farm inspection work to some extent, they were occupied chiefly: First, in making inspections where there was special reason to fear infection, as on reports on information from local veterinarians; second, in the eradication of centers of infection, including the destruction of herds and the disinfection of premises; third, in tracing shipments and in locating animals with regard to which there might be some suspicion and, fourth, in enforcing quarantine regulations with reference to shipments of scheduled animals and commodities.

The first general quarantine ever issued by the State Livestock Sanitary Board was that of November 13th. Two quarantine orders were issued by the State Livestock Sanitary Board November 24th. One of these (Appendix F.), forbade the removal of cattle, sheep, goats or swine from certain scheduled counties for any purpose or the movement of such animals into these counties excepting for

immediate slaughter. The other order (Appendix G.), forbade the driving or transportation of cattle, sheep, goats or swine over public roads or highways in scheduled counties, excepting upon specific permission, in writing, from an authorized agent of the State Livestock Sanitary Board.

An order was also issued (Appendix H.), forbidding the shipment of undisinfected hides or skins from the scheduled district. It was required that disinfection should be accomplished by immersion in a solution of carbolic acid (5 per cent.), or of bichloride of mercury (1 to 1,000), or of formalin (5 per cent.) Later, this order was amended to provide that dried sheep skins might be fumigated with formaldehyde gas instead of being dipped. As has previously been stated, the removal of hay, straw, forage or of any other product that might carry infection from premises that had been occupied by infected cattle was forbidden by the quarantine that was placed on such premises. Shipment of hay, straw and similar fodder was also prohibited by general orders from scheduled counties.

The district first quarantined by the State included entire counties excepting in Lycoming county, where the infection came from Union county and was confined to a single herd in the outskirts of Williamsport, and where the conditions were such that there appeared to be no possibility that infection could have escaped from the premises.

The area quarantined by the State was diminished by the order of December 22nd, effective December 28th (Appendix I). Under this order, the quarantine of certain parts of Dauphin, Juniata, Snyder, Union, Clinton and York counties was lifted as there appeared to be no evidence, or reason to suspect, that infection had been carried to these parts of counties. Two townships in the northeast corner of Perry county were included in the order of December 22nd, because infected cattle were removed from the premises of Wm. Troutman, of Meiserville, Snyder county, to the slaughter house of his son, H. N. Troutman, in Millersburg, Dauphin county, had passed through these townships. The premises at which these animals stopped on the way from Meiserville to Millersburg were quarantined and were held in quarantine until they were disinfected. While it was alleged that there had been no contact between these three cattle of N. H. Troutman and any other cattle, still, on account of the possibility of distribution of infection along the way, the two townships were quarantined until all cattle in them could be inspected.

The quarantines ordered by the State Livestock Sanitary Board were very faithfully observed. Railroads regularly refused to handle shipments of livestock, hides, hay, etc., excepting in conformity with the regulations established by the State Livestock Sanitary Board and the United States Department of Agriculture. The farmers and cattle dealers generally, throughout all portions of the State in which this work was carried on, realized the importance to them, of eradicating foot-and-mouth disease with the utmost expedition; they appreciated the necessity for the restrictions that were imposed and the regulations that were enforced and they co-operated with the authorities at almost every point. Public sentiment was such at the beginning of the outbreak, that violations of quarantine regulations would not have been tolerated in any community. Any inti-

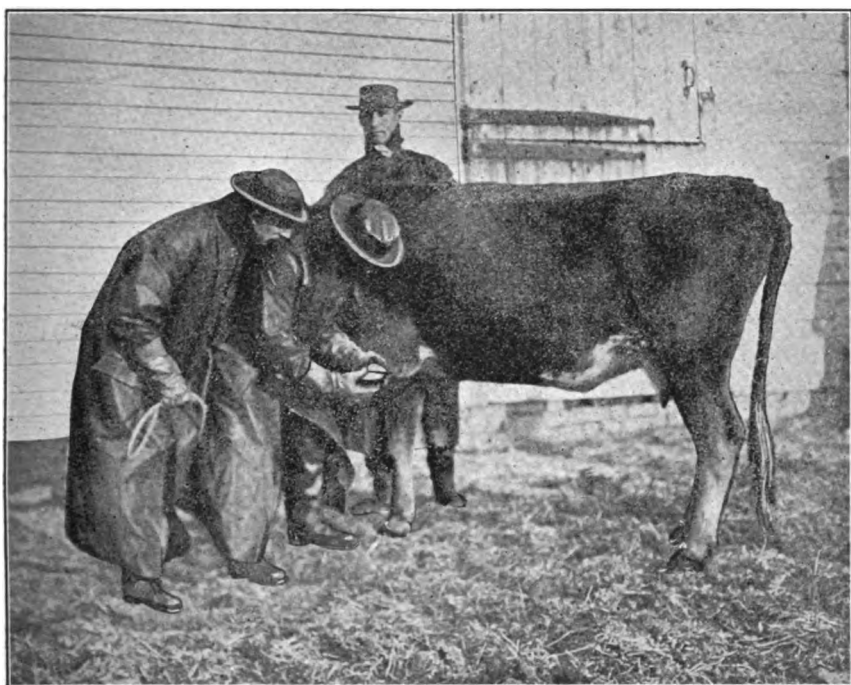


Figure 7. The examination of the feet of a cow with aphthous fever.

mation of violation in a neighborhood was followed by immediate reports to the office of the State Veterinarian. Later in the work, after all infected animals were killed and the danger appeared to be less, more difficulty was experienced in enforcing required regulations. Sheriffs, constables, police officers and officers of the law were called upon to assist in the enforcement of the quarantine regulations, and they did all that was required of them.

Quarantine restrictions forbidding the driving of cattle on public roads worked a good deal of hardship in some districts, on account of the unusual scarcity of water during the early winter. As the result of the prolonged absence of rain during the summer and fall, the water supply on many farms was exhausted. It had been customary, in such cases, for farmers to drive their cattle to the nearest spring or brook. After the quarantine order was established it became necessary to haul water in wagons. As soon, however, as inspections could be made in these regions, and it was ascertained that there were no local centers of infection, permits to drive cattle to water were issued.

Under the Federal quarantine order of November 19th, the entire State of Pennsylvania was quarantined, along with the State of New York. The Federal order had reference only to interstate or foreign transportation or shipment. When it became evident that there was no infection of foot-and-mouth disease in the northern and western counties of Pennsylvania, representations to this effect were made to the United States Department of Agriculture, with the request that uninfected districts in the State should be released from all quarantine restrictions. An amended quarantine order applying to Pennsylvania was issued January 2nd, 1909, effective on and after January 5th. This order scheduled twenty-five counties and a part of another county and forbade interstate shipments of cattle, sheep, other ruminants and swine from these counties, and also interstate and foreign shipments of hides, skins and hoofs and all cattle, sheep, other ruminants and swine without disinfection, and of hay, straw or similar fodder. Cattle, sheep, other ruminants and swine were permitted to be moved from other parts of Pennsylvania outside of these twenty-five counties, only for immediate slaughter, and on the condition that the authorities of the State or Territory to which the animals were destined had previously signified their willingness to accept such shipments. It was provided, further, that when such animals are shipped by rail or boat, they should not be unloaded enroute, either at points within or without the area quarantined for foot-and-mouth disease, excepting in pens designated for that purpose by the chief of the Bureau of Animal Industry, and that animals from Pennsylvania should not be unloaded into cleaned and disinfected pens especially designated by the Chief of the Bureau of Animal Industry under Rule 6, Division I for the yarding of livestock passing through the quarantined area.

This amendment to the Federal quarantine line laid down by the United States Department of Agriculture, within the State of Pennsylvania, should be enforced by the State Livestock Sanitary Board in the same manner as it would be enforced by the United States Department of Agriculture if it coincided with the boundary line of the State.

To comply with the conditions under which this amendment to the Federal quarantine order was issued, a new quarantine order was adopted by the State Livestock Sanitary Board on January 5th, 1909, extending the State quarantine restrictions to include the counties of Philadelphia, Delaware, Chester, Lancaster, Dauphin, Lebanon, Berks, Montgomery, Bucks, Lehigh, Northampton, Carbon, Schuylkill, Luzerne, Columbia, Montour, Northumberland, Lycoming, Clinton, Centre, Union, Snyder, Mifflin, Juniata and Perry, and a portion of York county (Appendix J.) On January 11th, new regulations regarding the transportation of hides were adopted, (Appendix K.)

A further modification in the Federal quarantine order was made on February 24th, 1909, effective February 25th, and on the same date the State Livestock Sanitary Board adopted a new quarantine order in accordance with the Federal modification, removing quarantine restrictions from a considerable area. (Appendix L.)

On March 22nd, 1909, the Federal authorities agreed to the release from quarantine of all districts under quarantine in Pennsylvania, except several townships, boroughs and cities in the counties in which the last cases of foot-and-mouth disease had been discovered, under the same conditions as the previous modifications had been made, and an order was accordingly adopted by the State Livestock Sanitary Board, which became effective on March 26th, 1909, the same date on which the Federal amendment went into effect.

On April 19th, 1909, an order was issued by the Secretary of the United States Department of Agriculture, which became effective on April 24th, 1909, revoking the remaining quarantine restrictions, and a similar order was at once adopted by the State Livestock Sanitary Board, which became operative on the same date, thus removing all quarantine restrictions five months and two weeks after the diagnosis of the first case was officially announced by Dr. Pearson.

BRANCH OFFICES

Arrangements were made to re-stock farms that had been infected, six weeks after the premises were disinfected. It was required that forage remaining on these farms should so far as possible be consumed on the farms. After the farms were re-stocked, they were visited by a State veterinary inspector at short intervals for several months.

As will be seen by the accompanying map and detailed outline, there was not merely one outbreak, but there were eight outbreaks of foot-and-mouth disease in rather widely spread separate parts of the State. The distance by rail from Norristown, the center of the most eastern outbreak, to Lock Haven, the most northern and western part of infection, is over two hundred miles.

It became evident from the beginning of this work that it would be necessary to have branch headquarters; accordingly, an office was opened in Danville to serve as a place from which to administer the work of that section. This office was used jointly for the work of the State Livestock Sanitary Board and the Bureau of Animal Industry; it was subsequently moved to Sunbury. Other branch offices were opened at Lancaster, Norristown, West Chester and Center Valley. The office at Center Valley was afterwards given up

and the work was moved to Allentown. Each branch office was placed in charge of an agent of the State Livestock Sanitary Board. Such offices were used for the administration of the local work of the State Livestock Sanitary Board, for gathering and classifying the reports to be forwarded to Harrisburg, to attend the correspondence on subjects relating to the repression of disease, to supervise the enforcement of the quarantine and for taking care of applications for permits to move animals in the respective localities. The amount of work that was transacted through these offices was very great. As many as three hundred applications for permits to move animals have been received at a single office in one day. Until the farm-to-farm inspections had been completed in townships it was necessary to make a special inspection with relation to each of these applications, before the permit could be acted on. This necessitated the employment of a large force of veterinarians, all of whom were kept very busy. At one time, more than twenty agents of the State Livestock Sanitary Board engaged in work with relation to the enforcement of quarantines and the issuance of permits were reporting to the branch office at Lancaster.

The branch offices were continued as long as quarantine regulations were in force and the necessity for the issuance of permits continued. These offices were in charge of the following veterinarians: Dr. George B. Jobson, Sunbury; Dr. P. K. Jones, Lancaster; Dr. J. Stewart Lacock, Norristown; Dr. E. Mayhew Michener, West Chester, and Dr. A. W. Wier, Allentown.

INSPECTORS

In the general work of the State Livestock Sanitary Board, in the management of this outbreak of foot-and-mouth disease, we were fortunate in having to start with, the services of ten specially competent veterinarians of the Meat Hygiene Service. These veterinarians were brought at once into the work and furnished the nucleus of an immediately available staff that was engaged constantly for a time following the beginning of the outbreak. Eighty-four veterinarians were employed by the State in this work for shorter or longer periods. It would have been necessary for the State to have employed veterinary service in much larger amount if it had not been for the help that the State Livestock Sanitary Board received from the United States Bureau of Animal Industry.

The veterinary inspectors of the Bureau of Animal Industry, under the able direction of Dr. Bennett, supplemented the work of the Board in many directions. During the acute period of the outbreak, when several reports of newly disclosed centers of infection were coming in daily to the office of the State Veterinarian, the most readily available men, irrespective of whether they were State or Federal employees, were sent to carry out the necessary measures. The same method was followed with relation to the destruction of infected herds; there was no exclusive classification or division of duties, or any arrangement as to whether a certain duty should be performed by a State or by a Federal veterinary inspector. When, however, the nature of the work was such as to necessitate the co-operation of two or more inspectors, it was usually arranged that both the State and Federal forces should be represented. The dis-

infection of premises, as has already been stated, was carried on in some instances under State, and in other instances under Federal supervision. The greater part of the work incident to the enforcement of quarantined lines and of State quarantine orders developed upon the staff of the State Livestock Sanitary Board, as has the greater bulk of the work in relation to the issuance of permits for the movement of animals and of commodities within the State. The principal part of the work of conducting farm-to-farm inspections was assumed by the veterinary inspectors of the Bureau of Animal Industry. The work of disinfecting hides for shipment interstate was supervised entirely by employes of the United States Bureau of Animal Industry. These employes have also in some instances supervised the disinfection of hides that were to be shipped within the State. Most of the work, however, in supervising the disinfection of hides for intra-state shipment developed upon the agents of the State Livestock Sanitary Board.

An excessively heavy correspondence and a very great amount of office work had to be conducted in the office of the State Livestock Sanitary Board at Harrisburg. An office staff of eleven people, under the direction of Dr. Louis A. Klein, Deputy State Veterinarian, was engaged upon the necessary work incident to the control and eradication of this disease.

In addition to the clerical staff at Harrisburg, clerks or stenographers were employed at Sunbury, Lancaster, Norristown, West Chester and Allentown. The necessity for a great amount of correspondence and record keeping will be understood, when it is recalled that, at times during the outbreak, the quarantine lines established by the State included as many as fifty thousand farms, the occupants of all of which were placed under some restraint, the meaning of which had to be explained to many people. Moreover, the Federal quarantine district from November 19th, 1908, to January 5th, 1909, comprised the entire State, with more than two hundred and twenty thousand farms. Traffic in cattle, sheep, other ruminants and swine, and in hides, skins and hoofs, and in hay, straw and similar forage was prohibited, or was subjected to certain restrictions. Farmers, shippers, railroad officials and railroad agents were continually applying for advice in person, by letter, telegraph and telephone. It was necessary during all of this period to keep the office of the State Veterinarian open from 7 a. m. to 12 p. m., including Sundays and holidays. After the first report of the possible existence of foot-and-mouth disease in Pennsylvania came to me, November 7th, it was necessary for me to neglect many important duties in relation to other work for a considerable period, as all of my time was devoted to the control and eradication of this disease.

I desire here to record my appreciation of the help and impetus given to this work, at every point, by the Governor and the members of the State Livestock Sanitary Board. From the beginning of the outbreak the Governor insisted that nothing that the State can properly do to repress this disease be omitted and furnished every possible assistance to this end.

The veterinarians of Pennsylvania were exceptionally well equipped to enter a fight of this kind, on account of the system that has been followed for a long term of years for keeping the private practitioners in touch with the public veterinary work of the State.

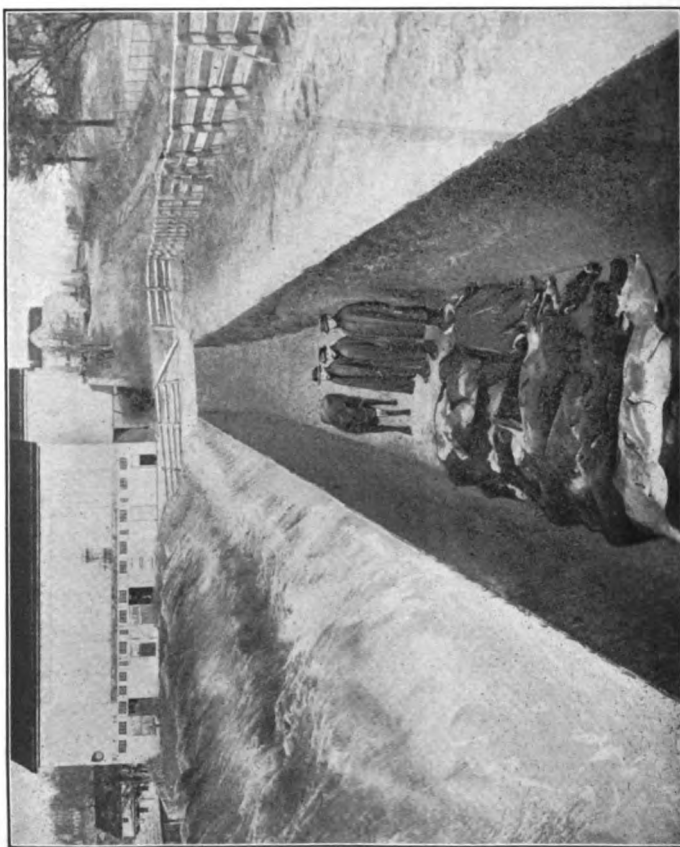


Figure 9. A pit in which a herd of fifty-five cows was buried. The cattle were led down the incline and were then shot and bled in the pit. Afterwards they were disemboweled, the hides were slashed and they were covered with quick lime.

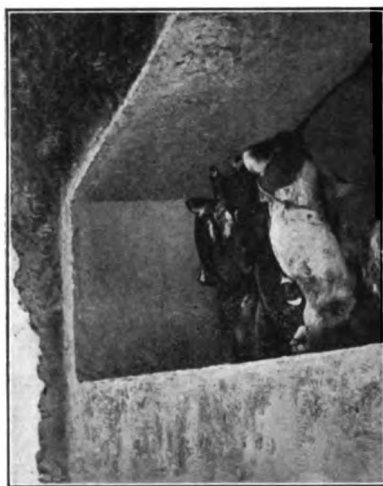


Figure 8. A pit seven feet wide, seven feet deep and twenty-four feet long, for the burial of fourteen cattle and six pigs. The cattle were shot on the edge of the pit and were then rolled into it, where they were bled.



Figure 10. To show the clothing worn by inspectors working on foot-and-mouth disease and their method of cleaning their clothing before leaving infected premises. Note the rubber hats, coats, gloves and boots. One inspector has been sponged, the other is being sponged, with a 1 to 500 solution of bichloride of mercury.

Shortly after the beginning of the outbreak, a number of veterinarians from all parts of the State were called to Danville, Milton and Lewistown to see affected animals and to become familiar with the manifestations of the disease. These veterinarians were afterwards of great service in this work.

The veterinarians of the State, as a whole, are highly skilled and a disciplined body of men; their attitude toward veterinary work, their realization of their responsibility in relation to such work, their willingness to co-operate and their efficiency were of great service and advantage to the Commonwealth and to the nation in this emergency. A large number of veterinarians gave up all of their private work and entered the service of the State, for an amount of compensation very much less than the value of their practice. They did this because they realized the magnitude of the danger to agriculture and because they were willing to sacrifice their own interests for the benefit of the country, just as a man would volunteer for service during a war.

We could have enlisted the service of many more of the veterinarians of the State and undoubtedly could have conducted all of the essential work repressing foot-and-mouth disease in Pennsylvania without outside assistance, if this had been necessary. It was not necessary because we had the assistance of the highly efficient staff of the veterinary service of the United States Department of Agriculture. The work was much facilitated and expedited by the agency of members of this staff of Federal veterinary inspectors, some of whom, and especially their competent leader, Dr. Bennett, had experience afforded by the work of exterminating foot-and-mouth disease from New England six years ago. When, however, foot-and-mouth disease was found to exist in New York, Maryland and Michigan most of the Federal veterinary inspectors who had been employed in the New England outbreak were withdrawn from Pennsylvania for services in other states.

The advantages from co-operation with the United States Department of Agriculture consisted in obtaining upon short notice the services of a large corps of disciplined inspectors, some of whom had previous experience with this disease, and of sharing the cost of the work with the Federal government, thus effecting a saving to the treasury of the State.

SUMMARY

The following is a condensed statement with relation to the eight outbreaks of foot-and-mouth disease that have occurred in Pennsylvania. This statement shows the source of infection, in each case, to have been cattle shipped from East Buffalo, N. Y. Facts in relation to these several shipments of infected and exposed cattle are set forth, and lists are furnished of all herds that became infected, directly or indirectly, from such shipments. This summary also shows the location of the various infected herds, the number of diseased and exposed animals, the dates when the separate lots of infected animals were killed, and the appraisements. Memoranda are added to show by whom report was first made, diagnosis established and quarantine laid, as recorded in the office of the State Livestock Sanitary Board.

DANVILLE OUTBREAK

Source: J. C. Campbell shipped a carload of cattle from East Buffalo, N. Y., October 26th, 1908, to Danville, Montour county, Pa. These cattle were received October 27th, 1908. The origin of these cattle was as follows: Blaine, Mich., 1 head; Mt. Pleasant, Mich., 1 head; Melvin, Mich., 1 head; Clare, Mich., 2 head; North Manchester, Ind., 1 head; Ransom, Ohio, 1 head; Bad Axe, Mich., 1 head; Marion, Ohio, 11 head. The shipments comprised 10 steers and 9 bulls. The steers were slaughtered at Danville. Eight bulls were sold and one was taken by Mr. Campbell to his own farm in Rush township, Northumberland county.

This outbreak became known through a report from Dr. J. O. Reed, of foot-and-mouth disease in the herd of Jacob Schultz, (1). Infection was then traced back to cattle sold by Mr. Campbell. All cattle exposed to the Campbell cattle were sought and quarantined. The following herds became infected by or from cattle of this shipment:

1. Jacob Schultz, Cooper township, Montour county.
Mr. Schultz bought one bull from J. C. Campbell, October 29th, 1908. Reported by J. O. Reed. Inspected and quarantined by T. E. Munce, November 7th, 1908. Diagnosis confirmed by Leonard Pearson, November 8th, 1908.
Animals destroyed: 40 cattle, 18 swine.
Appraisement of animals, \$2,018.50.
2. James Schultz, Borough of Danville, Montour county.
Inspected and quarantined by Dr. D. E. Hickman, November 14th, 1908. James Schultz visited and examined the diseased cattle of his son, Jacob Schultz, three miles away, and afterwards cared for his own family cow, which subsequently developed foot-and-mouth disease.
Animals destroyed: 1 cow, 4 swine.
Appraisement of animals, \$77.
3. E. E. Bogert, Rush township, Northumberland county.
Inspected by J. O. Reed, and H. R. Church. Quarantined November 8th, 1908, by J. O. Reed.
Mr. Bogert bought a bull from J. C. Campbell, October 29th, 1908.
Animals destroyed: 24 cattle, 18 swine.
Appraisement of animals, \$796.50.
4. Edward Sees, Rush township, Northumberland county. Mr. Sees had one cow on the premises of E. E. Bogert.
This cow was inspected and quarantined with the cattle of E. E. Bogert.
Animals destroyed: 1 cow.
Appraisement of animal, \$60.
5. H. E. Fisher, Rush township, Northumberland county.
Inspected by J. O. Reed and G. M. Graybill.
Quarantined by J. O. Reed, November 8th, 1908.
Mr. Fisher bought 1 bull from J. C. Campbell, October 29th, 1908.
Animals destroyed: 13 cattle, 21 swine.
Appraisement of animals, \$578.

6. P. W. Mettler, Rush township, Northumberland county.
Inspected by J. O. Reed and G. M. Graybill.
Quarantined by J. O. Reed, November 10th, 1908.
Mr. Mettler bought 2 cows from J. C. Campbell, October 29th, 1908.
Animals destroyed: 5 cattle, 11 swine.
Appraisement of animals, \$305.50.
7. Norman C. Reed, Rush township, Northumberland county.
Inspected by J. O. Reed and D. E. Hickman.
Quarantined by J. O. Reed, November 9th, 1908.
Mr. Reed bought 1 bull from J. C. Campbell, October 29th, 1908.
Animals destroyed: 8 cattle, 21 swine.
Appraisement of animals, \$271.30.
8. E. H. Schultz, Rush township, Northumberland county.
Inspected by J. O. Reed, T. E. Munce, C. C. McLean and George B. Jobson.
Quarantined by J. O. Reed, November 7th, 1908.
Mr. Schultz bought 1 bull from J. C. Campbell, October 29th, 1908.
Animals destroyed: 13 cattle, 25 swine.
Appraisement of animals, \$563.50.
9. J. C. Campbell, Rush township, Northumberland county.
Inspected by J. O. Reed and J. H. Turner.
Quarantined by J. O. Reed, November 8th, 1908.
Mr. Campbell took to his farm October 28th, 1908, 1 bull of his shipment from Buffalo.
Animals destroyed: 10 cattle, 44 swine.
Appraisement of animals, \$730.70.
10. Charles A. Gulick had a brood sow which strayed onto the farm of Mr. Campbell. It was quarantined there and was destroyed with Mr. Campbell's cattle.
Animals destroyed, 1 sow.
Appraisement of animal, \$18.00.
Total number of animals destroyed in the Danville outbreak: cattle, 115, swine, 163.
Total appraisement for animals, \$5,419.

WATSONTOWN OUTBREAK

Source: James M. Montgomery shipped a carload of young cattle from East Buffalo, N. Y., October 26th, 1908, to Watsonstown, Northumberland county. These cattle were received October 27th, 1908; their origin was as follows: Toronto, Canada, 32 head; Clare, Mich., 5 head; Honeey Falls, N. Y., 2 head. The shipment comprised 39 head. Some of these were slaughtered, others were sold in the neighborhood, but most of them were taken to Mr. Montgomery's farm near Turbotville. This outbreak became known through a report from Dr. H. T. McNeal, of foot-and-mouth disease in the herd of Eli Yost (15). Infection was traced to the premises of J. M. Montgomery. All cattle sold by Mr. Montgomery or exposed to his cattle were sought out and quarantined. The list of cattle sold was obtained by Leonard Pearson November 9th, and 10th, 1908, and the cattle were traced immediately. The following herds became infected directly or indirectly from the cattle of this shipment.

Two hours after Mr. Montgomery's cattle had been unloaded over the platform of the railroad station at Watson town, some cows shipped to E. E. Shively were unloaded. These cows did not come in contact with the Montgomery cattle, but only with the platform and the surface over which Mr. Montgomery's cattle had passed a short time before.

11. George Kerstetter, Delaware township, Northumberland county.
Inspected by A. O. Cawley, George B. Jobson, O. G. Noack and H. T. McNeal.
Quarantined by A. O. Cawley, November 11th, 1908.
Mr. Kerstetter bought 1 steer from J. M. Montgomery, November 6th, 1908.
Animals destroyed: 1 steer.
Appraisement of animal, \$32.
12. S. M. Blaine, Turbotville, Lewis township, Northumberland county.
Inspected by A. O. Cawley, H. T. McNeal and H. R. Church.
Quarantined by A. O. Cawley November 11th, 1908.
Mr. Blaine bought 1 bull from J. M. Montgomery, November 7th, 1908.
Animals destroyed: 1 bull.
Appraisement of animal, \$18.20.
13. Jerry Renn, Lewis township, Northumberland county.
Inspected by Leonard Pearson, H. T. McNeal, A. O. Cawley, H. R. Church, George B. Jobson and O. G. Noack.
Quarantined by Leonard Pearson November 9th, 1908.
Mr. Renn bought 2 heifers from J. M. Montgomery November 6th, 1908.
Animals destroyed: 13 cattle, 29 swine.
Appraisement of animals, \$684.
14. W. T. Nye, Delaware township, Northumberland county.
Inspected by A. O. Cawley, O. G. Noack, H. T. McNeal and H. R. Church.
Quarantined by A. O. Cawley November 11th, 1908.
Mr. Nye bought 2 steers from J. M. Montgomery November 6th, 1908.
Animals destroyed: 11 cattle, 5 swine.
Appraisement of animals, \$474.65.
15. Eli Yost, Delaware township, Northumberland county.
Inspected by H. T. McNeal, Leonard Pearson, O. G. Noack and A. O. Cawley.
Quarantined by Leonard Pearson November 9th, 1908.
Mr. Yost removed November 2nd, 1908, to his farm, a cow that had been pasturing on Mr. Montgomery's farm and that had been in contact with the cattle shipped from East Buffalo, N. Y.
Animals destroyed: 16 cattle, 40 swine.
Appraisement of animals, \$850.



Figure 11. To show the fumigation cape beneath which formaldehyde gas is liberated from formalin by the use of permanganate of potash. The gas is confined by the cape and surrounds the garments of the inspector.

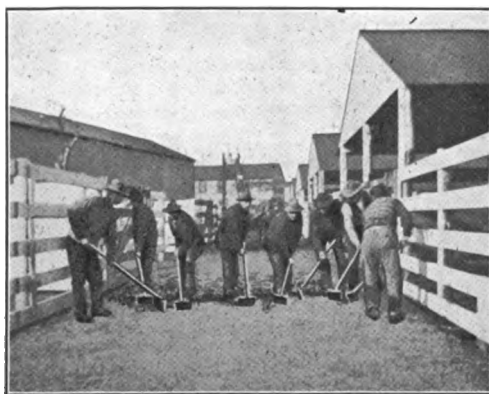


Figure 12. Cleaning an alley in the Lancaster stockyards, preliminary to disinfection.

16. Charles A. Noll, Kelly township, Union county.
 Inspected by O. G. Noack, George B. Jobson, H. R. Church and P. K. Jones.
 Quarantined by O. G. Noack November 11th, 1908.
 Two cows were placed on Mr. Noll's farm November 3rd, 1908, by Lewis Magee. These cows were purchased from Eli Yost and had been pastured on the farm of J. M. Montgomery and had been in contact with the cattle shipped from East Buffalo, N. Y. These two cows were part of a lot of 19 head that Mr. Magee had purchased and was storing on Mr. Noll's farm until he should have a carload ready for shipment to Chester county. Mr. Magee's cattle and Mr. Noll's cattle were in contact and all became infected.
 Animals destroyed: property of C. A. Noll, 17 cattle, 21 swine.
 Appraisement of animals, \$700.
 Animals destroyed: property of Lewis Magee, 19 cattle.
 Appraisement of animals, \$638.50.
17. Lewis Magee, Lewisburg, Union county.
 Inspected by George B. Jobson, E. P. Althouse, O. G. Noack and A. O. Cawley.
 Quarantined by George B. Jobson and A. O. Cawley, November 14th, 1908.
 Mr. Magee bought 1 cow from E. E. Shively, November 4th, 1908. He had 6 cows and 2 calves in the stable on his premises in Lewisburg that he had purchased at different times and that were intended for sale.
 Animals destroyed: 8 cattle.
 Appraisement of animals, \$330.
18. Harry Bressler, Lewis township, Northumberland county.
 Inspected by H. R. Church.
 Quarantined by H. R. Church, December 1st, 1908.
 This herd is supposed to have become infected through contagion carried on the clothing of Mr. Bressler, father of Harry Bressler, who was employed by Eli Yost and who worked among Mr. Yost's diseased cattle.
 Animals destroyed: 8 cattle, 15 swine.
 Appraisement of animals, \$331.
19. C. A. Herman, Buffalo township, Union county.
 Inspected by Geo. B. Jobson, P. K. Jones, O. G. Noack and A. O. Cawley.
 Quarantined by George B. Jobson November 12th, 1908.
 Mr. Herman bought a cow from Lewis Magee November 7th, 1908. This cow had been on the farm of C. A. Noll.
 Animals destroyed: 11 cattle, 18 swine.
 Appraisement of animals, \$649.50.
20. J. M. Montgomery (Mrs. E. S. Montgomery), Lewis township, Northumberland county.
 Inspected by Leonard Pearson, H. T. McNeal, O. G. Noack, George B. Jobson, H. R. Church and A. O. Cawley.
 Quarantined by Leonard Pearson November 9th, 1908.

Mr. Montgomery brought most of the cattle of his shipment from East Buffalo, N. Y., to his farm October 27th, 1908, where they came in contact with 5 heifers belonging to himself, 2 cows belonging to B. Bergerstock and 3 cows belonging to Eli Yost. One of the Yost cows was removed to Mr. Yost's farm November 2nd, 1908; the other 2 were sold to Lewis Magee, who took them to the farm of C. A. Noll.

Animals destroyed: 28 cattle, 40 swine.

Appraisement of animals, \$753.50.

21. Bertram Bergerstock, Lewis township, Northumberland county. Mr. Bergerstock had two cows on Mr. Montgomery's farm. Both became infected by contact with the cattle from East Buffalo. Animals destroyed: 2 cows.
Appraisement of animals, \$105.00.
22. B. F. Schreck, White Deer township, Northumberland county. Inspected by H. R. Church, H. T. McNeal and George B. Jobson. Quarantined by H. R. Church November 25th, 1908. Mr. Schreck bought 3 cows and 1 bull from E. E. Shively November 4th, 1908.
Animals destroyed: 16 sheep, 22 cattle, 39 swine.
Appraisement of animals, \$1,478.
23. C. H. Winters, Williamsport, Lycoming county. Inspected by H. R. Church and H. T. McNeal. Quarantined by H. T. McNeal December 3rd, 1908. Mr. Winters bought 2 cows from E. E. Shively, November 4th, 1908.
Animals destroyed: 24 cattle, 12 swine.
Appraisement of animals, \$1,600.
24. W. C. Foresman, Gregg township, Union county. Inspected by H. R. Church and H. T. McNeal. Quarantined by H. R. Church December 8th, 1908. Mr. Foresman bought 3 cows from E. E. Shively November 4th, 1908.
Animals destroyed: 39 cattle, 56 swine.
Appraisement of animals, \$1,351.80.
Total number of animals destroyed in the Watsonstown outbreak: cattle, 220; swine, 275; sheep, 16.
Total appraisement of animals, \$9,996.15.

LOCK HAVEN OUTBREAK.

Source: Two butchers on the outskirts of Lock Haven, F. L. Winner and B. Zuber, have for a long time been engaged in shipping cattle for slaughter from East Buffalo, N. Y. Just what shipment brought the infection of foot-and-mouth disease from East Buffalo to Lock Haven has not been determined, as all of the cattle from that place had been slaughtered before knowledge of foot-and-mouth disease came to Dr. C. R. Good, and was by him transmitted to the office of the State Veterinarian. The first discovered appearance of this disease in the locality was among the cattle of Roy M. Hanna, whose pasture is near the Winner slaughter house, and also near that of Zuber.

The outbreak became known through a report received November 19th, 1908, by the State Veterinarian from Dr. C. R. Good, of foot-and-mouth disease among Mr. Hanna's cattle. No infection of foot-and-mouth disease was at any time found on Mr. Zuber's premises. There was very extensive infection among hogs on Mr. Winner's premises.

The origin of these cattle was as follows: Eaton, Ind., 2 head; Alexander, N. Y., 1 head; Bryan, Ohio, 1 head; Hudson, Mich., 1 head; Thomas, Mich., 16 head; Adrian, Mich., 6 head; Manchester, Mich., 4 head; Harbor Beach, Mich., 3 head; Camden, Mich., 1 head; Pigeon, Mich., 6 head; Hilsdale, Mich., 4 head.

The infected cattle were presumably among cattle shipped from East Buffalo in one of the following loads:

November 2nd, 1908, ...36 head.
November 9th, 1908, ...24 head.

25. F. L. Winner, Lock Haven, Clinton county.

Mr. Winner received and slaughtered between October 19th and November 9th, 1908, inclusive, 103 cattle from East Buffalo.

Hogs infected with foot-and-mouth disease were in the yard of the slaughter house where these cattle were slaughtered.

Inspected and quarantined by Edward Seidel November 23rd, 1908.

Animals destroyed: 80 swine.

Appraisalment of animals, \$580.

26. Roy M. Hanna, Castanea township, Clinton county.

Mr. Hanna pastured cattle in a field near the slaughter house premises on which there were many hogs affected with foot-and-mouth disease.

Inspected and quarantined by Edward Seidel November 21st, 1908.

Animals destroyed: 18 cattle, 57 swine.

Appraisalment of animals, \$1,021.87.

27. H. G. Maurer, Porter township, Clinton county.

Mr. Maurer delivered sheep to Mr. Winner's slaughter house November 14th, 1908, while Mr. Winner's premises were infected with foot-and-mouth disease. When delivering the sheep, he walked through the infected premises. Presumably he carried infection on his boots or clothing to his own farm.

Inspected and quarantined by Edward Seidel November 22nd, 1908.

Animals destroyed: 6 cattle, 25 swine, 24 sheep.

Appraisalment of animals, \$515.50.

28. H. H. Martin, Lamar township, Clinton county.

Mr. Martin's father, C. W. Seaholtz, purchased from Roy M. Hanna, 1 sow and 7 young pigs about November 15th, 1908.

Inspected and quarantined by Edward Seidel November 2nd, 1908.

Animals destroyed: 20 cattle, 30 swine.

Appraisalment of animals, \$775.

29. **Hayes Dorey, Island, Dunstable township, Clinton county.**
 Mr. Dorey had but one cow; it was taken to Mr. Hanna's farm for service by Mr. Hanna's bull, November 15th, 1908.
 Inspected and quarantined by Edward Seidel November 23rd, 1908.
 Animals destroyed: 1 cow, 4 swine.
 Appraisement of animals, \$75.
 Total number of animals destroyed in the Lock Haven outbreak: cattle, 45; swine, 196; sheep, 24.
 Total appraisement of animals, \$2,967.37.

VERA CRUZ OUTBREAK

Source: A. J. Bean shipped a carload of cattle from East Buffalo, N. Y., November 2nd, 1908, to Vera Cruz, Lehigh county. These cattle were received November 3rd, 1908. The origin of the cattle was as follows: Applegate, Mich., 1 head; Sinclairville, N. Y., 6 head; Sinclairville, N. Y., 1 head; Russel, Pa., 7 head; Claypool, Ind., 2 head; Belvidere, N. Y., 7 head; Stanton, Mich., 1 head.

These cattle were driven to Limeport, Lehigh county, and were placed in the yard of the hotel kept by A. F. Frantz; they were sold November 6th, 1908. There is no history to prove that any of the cattle were diseased at that time. This outbreak became known through a report received at the office of the State Veterinarian, Harrisburg, Pa., November 16th, 1908, from Dr. O. J. Biehlm, of Center Valley, Lehigh county. Dr. Biehlm found seven affected animals in a herd of twenty belonging to John H. Stauffer. The infection of this herd was traced to cattle sold by A. J. Bean. All cattle of the infected shipment and cattle that were exposed to them were inspected and quarantined. There was no extension of this outbreak beyond the herds infected directly by the animals received from East Buffalo. The following herds became infected directly by cattle from this shipment:

30. **John H. Stauffer, Upper Saucon township, Lehigh county.**
 Mr. Stauffer bought 2 steers from A. J. Bean, November 6th, 1908.
 Inspected by C. C. McLean, G. M. Graybill, G. G. Blank and O. J. Biehlm.
 Quarantined by G. M. Graybill November 16th, 1908.
 Animals destroyed: 20 cattle, 13 swine.
 Appraisement of animals, \$982.50.
31. **M. O. Schantzenbach, Upper Milford township, Lehigh county.**
 Mr. Schantzenbach bought 2 bulls from A. J. Bean, November 6th, 1908.
 Inspected by C. C. McLean and G. M. Graybill November 18th, 1908.
 Quarantined by G. M. Graybill November 18th, 1908.
 Animals destroyed: 4 cattle, 7 swine.
 Appraisement of animals, \$264.22.
32. **Lewis Morgan, Upper Milford township, Lehigh county.**
 Mr. Morgan bought 4 bulls from A. J. Bean November 6th, 1908.
 Inspected by C. C. McLean and G. M. Graybill.
 Quarantined by C. C. McLean November 18th, 1908.
 Animals destroyed: 15 cattle, 11 swine.
 Appraisement of animals, \$705.00.

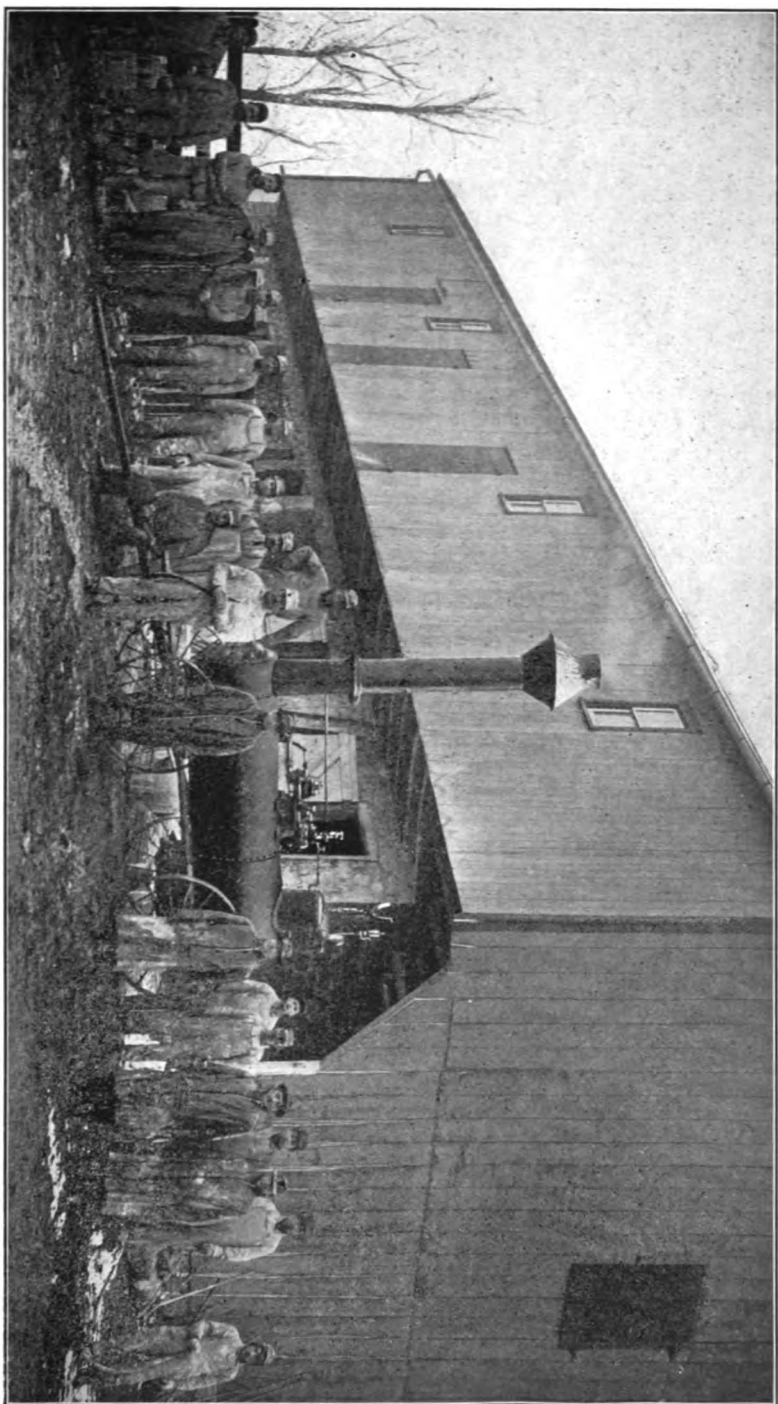


Figure 18. A steam pump mounted on a portable boiler, an original device for rapid and thorough disinfection equipped especially for and purchased by the Pennsylvania State Livestock Sanitary Board. By employing a force of disinfectors as shown in this photograph a large barn and surroundings could be cleaned and disinfected in two or three days.

33. H. C. Bahl, Upper Saucon township, Lehigh county.
Mr. Bahl bought 1 bull from A. J. Bean, November 6th, 1908.
Inspected by G. M. Graybill and C. C. McLean, November 18th, 1908.
Quarantined by C. C. McLean November 18, 1908.
Animals destroyed: 3 cattle, 16 swine.
Appraisement of animals, \$177.53.
34. A. F. Frantz, Lower Milford township, Lehigh county.
Mr. Frantz bought 1 bull from A. J. Bean, November 6th, 1908.
Inspected by C. C. McLean and G. M. Graybill.
Quarantined by C. C. McLean, November 18th, 1908.
Animals destroyed: 1 bull.
Appraisement of animal, \$21.18.
35. Samuel E. Hartman, Upper Saucon township, Lehigh county.
Mr. Hartman bought 1 cow from A. J. Bean, November 6th, 1908.
Inspected by G. M. Graybill and C. C. McLean.
Quarantined by G. M. Graybill, November 19th, 1908.
Animals destroyed: 8 cattle, 11 swine.
Appraisement of animals, \$316.25.
36. Bernard Selig, Upper Saucon township, Lehigh county.
Mr. Selig purchased 9 bulls from A. J. Bean, November 6th, 1908.
Inspected by G. M. Graybill and C. C. McLean.
Quarantined by C. C. McLean, November 19th, 1908.
Animals destroyed: 14 cattle, 10 swine.
Appraisement of animals, \$371.
37. Charles Schaffer, Lower Milford township, Lehigh county.
Mr. Schaffer bought 1 cow from A. J. Bean, November 6th, 1908.
Inspected by G. M. Graybill and C. C. McLean.
Quarantined by G. M. Graybill, November 19th, 1908.
Animals destroyed: 5 cattle, 5 hogs.
Appraisement of animals, \$229.
38. John Jacoby, Upper Saucon township, Lehigh county.
Mr. Jacoby purchased 2 bulls from A. J. Bean, November 6th, 1908.
Inspected by N. A. Fulmer, O. J. Biehn and C. C. McLean.
Quarantined by N. A. Fulmer, December 1st, 1908.
Animals destroyed: 23 cattle, 18 swine.
Appraisement of animals, \$848.00.
Total number of animals destroyed in the Vera Cruz outbreak:
cattle, 93; swine, 91.
Total appraisements of animals, \$3,914.68.

GERMANSVILLE OUTBREAK

Source: George A. Bachman shipped two carloads of cattle comprising 64 head from East Buffalo, October 26th, 1908, to Germansville, Lehigh county. These cattle were received October 28th, 1908. The cattle of the shipment were divided into two lots, one of which was sent to Neffs, Lehigh county, where they were sold October 30th, 1908, and the other lot was sold at Germansville, October 29th, 1908. The cattle shipped by Mr. Bachman were from a lot of 80 cows that originated as follows: Reed City, Mich., 2 head; Flushing, Mich., 2 head; Melvin, Mich., 22 head; Sinclairville, N. Y., 1 head; Brown

City, Mich., 1 head; Harrisville, Mich., 2 head; Beilvere, Mich., 1 head; Cincinnati, Ohio, 2 head; Avoca, Mich., 16 head; Fillmore, N. Y., 4 head; McGregor, Mich., 5 head; Hershey, Mich., 5 head; Deckerville, Mich., 15 head; Stroh, Ind., 1 head; Bryan, Ohio, 1 head.

Report of this outbreak was received from Dr. C. D. Werley, November 18th, 1908. The report showed that a bull purchased from Mr. Bachman by Frank Metzger developed foot-and-mouth disease and afterwards Mr. Metzger's cows became infected. This bull is the only animal of the lot sold at Germansville that is known to have carried infection. Other animals of this lot were traced and were held in quarantine for a number of weeks and were released when it was found that neither they nor the cattle with which they were associated presented any evidence of foot-and-mouth disease. Of the cattle sold at Neffs, two carried infection.

The fact that so few cattle of this lot of the 64 carried the infection of foot-and-mouth disease is no doubt to be explained by the presumption that all of these animals were free from infection when they were received at the stock-yards at East Buffalo. It appears that only a part of the animals were exposed in the East Buffalo stockyards and these did not develop disease until after they had been sold by Mr. Bachman; consequently the other cattle of the Bachman shipments were not directly exposed and did not become infected. The cattle were in Mr. Bachman's possession a very short time as will be seen by the dates of his transactions; they were purchased in Buffalo, October 26th, 1908, and were sold three or four days later. If Mr. Bachman had kept these cattle a few days longer before they were sold, undoubtedly they would have carried the infection into most of the herds they entered.

39. Frank Metzger, Lynn township, Lehigh county.

Mr. Metzger purchased 3 cattle for slaughter from G. A. Bachman, October 29th, 1908. He took the cattle home and turned them into pasture with his native cattle. The disease was first observed in the bull purchased from Bachman.

Inspected by C. D. Werley and A. O. Cawley.

Quarantined by A. O. Cawley, November 19th, 1908.

Animals destroyed: 5 cattle, 6 swine.

Appraisal of animals, \$256.

40. John Schneck, North Whitehall township, Lehigh county.

Mr. Schneck purchased 1 heifer from George A. Bachman at Neffs, October 30th, 1908.

Inspected and quarantined by A. O. Cawley, November 21st, 1908.

Animals destroyed: 4 cattle, 5 swine.

41. David Fenstermacher, Lowhill township, Lehigh county.

Mr. Fenstermacher purchased 1 bull from G. A. Bachman at Neffs, October 30th, 1908.

Inspected and quarantined by A. O. Cawley, November 24th, 1908.

Animals destroyed: 6 cattle, 4 swine.

Appraisal of animals, \$203.

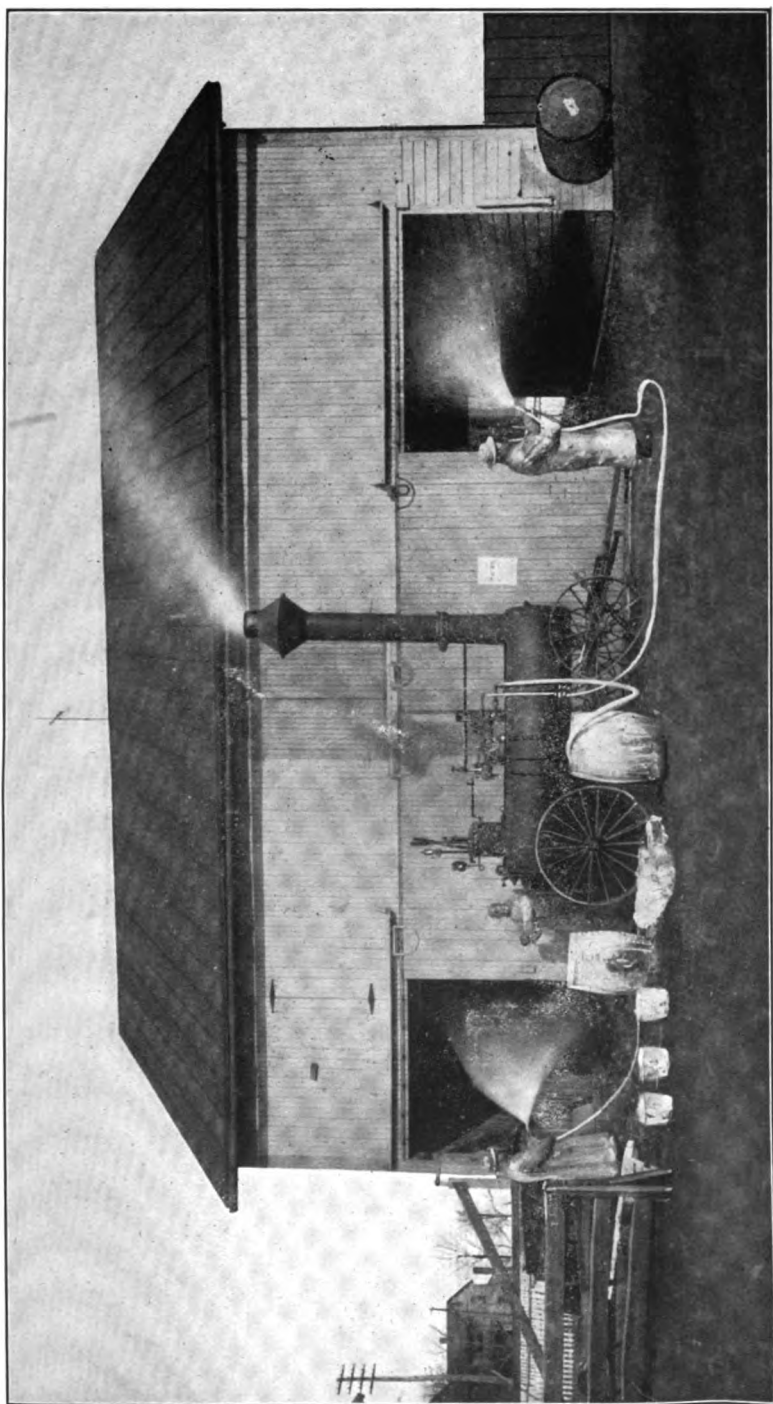


Figure 14. The disinfection of a small barn with a State Livestock Sanitary Board steam disinfection pump. (The State had three steam pumps in use for purposes of disinfection.)

42. Herbert M. Wotring, Lowhill township, Lehigh county.

The infection in this case was probably carried by Mr. Wotring's boy who was said to have visited the premises of David Fenstermacher (41).

Inspected and quarantined by G. E. Totten, S. L. Bond and G. D. Warner, November 27th, 1908.

Animals destroyed: 12 cattle, 6 swine.

Appraisement of animals, \$488.

Total number of animals destroyed in the Germansville outbreak: cattle, 27; swine, 21.

Total appraisements of animals, \$1,167.

MIDDLEBURG OUTBREAK

Source: William Troutman shipped from East Buffalo, N. Y., Monday, November 2nd, 1908, a carload of cattle comprising 30 young feeder steers and 3 butcher steers. These cattle were received at Middleburg, November 30th, 1908, and were unloaded at the unloading chute near the railroad station. The cattle were kept over night in the field of W. Kuster, near his mill, upon the edge of Middleburg. From this field 15 steers were sold to E. Bower. The next morning, Wednesday, November 4th, 1908, the remaining cattle were taken to Fremont. One steer was sold at Fremont to Thomas F. Reichenbach and one steer to Isaac Mengle. The cattle were kept Wednesday night at E. Garman's, near Fremont. The 3 butcher steers were taken from the drove at Fremont and were driven to Wm. Troutman's farm at Meiserville, whence they were moved Friday, November 6th, 1908, to H. N. Troutman's slaughter house, Millersburg, Dauphin county. From Fremont the cattle were driven to Evendale, Juniata county, where 4 were sold November 5th, 1908, to M. D. Shirk and 9 to Jacob Schallenberger.

A second lot of cattle was purchased in Buffalo Monday, November 9th, 1908. This lot comprised 18 steers and 8 heifers.

These cattle were received at Middleburg Tuesday, November 10th, and were unloaded over the same chute as that used for the shipment of the preceding week, and spent Tuesday night in the same pasture field of W. Kuster that was occupied the week before by the earlier shipment. At Middleburg 3 steers and 1 heifer was sold to A. H. Dinius, at Kramer. The cattle were taken from Middleburg from Mr. Troutman's farm at Meiserville, Wednesday, November 11th. George Rine bought 8 steers which were at once removed to his own farm; A. Bichart of Meiserville, bought 1 heifer; J. M. Bason of Richfield, Juniata county, bought 5 heifers and H. N. Troutman of Millersburg, Dauphin county, 3 butcher cattle, which were removed to his slaughter house Tuesday, November 7th, 1908. Wm. Troutman retained of this shipment 1 heifer and 4 steers.

The first symptoms among Mr. Troutman's cattle were seen Sunday, November 15th, 1908. The first animal showing evidence of foot-and-mouth disease was a small native cow that had been on Mr. Troutman's premises before this shipment arrived. Two other cattle exhibited symptoms before evening of the same day. On Monday, November 16th, 1908, a steer became affected and then the other 3 steers.

Knowledge of this outbreak was received by telephone at the office of the State Veterinarian from Dr. A. R. Potteiger, of Selins Grove, who had been called in to see these cattle Tuesday, November 17th, 1908. Mr. Troutman's herd was inspected and quarantined November 18th, 1908, by Leonard Pearson. At that time, 4 steers of the shipment from Buffalo were exhibiting distinct evidence of foot-and-mouth disease in the earlier stages; in two of them the vesicles had broken. The heifer of the Buffalo shipment of November 9th, showed no distinct evidence of foot-and-mouth disease but it was found to have a temperature of 105.4° F. The following day there were well marked vesicles in the mouth of this heifer. From the history of development of foot-and-mouth disease of these cattle it would seem to be probable that they were infected as a result of exposure sustained at about the time or shortly after their arrival at Middleburg.

On the occasion of the first visit to Mr. Troutman's farm a complete list was obtained of all the cattle that had been sold from the two shipments. These animals and the premises that they had gone to were immediately inspected. The following herds became infected by or from the cattle of this shipment:

43. E. Bower, Franklin township, Snyder county.
Inspected and quarantined by E. S. Deubler, November 18th, 1908.
Animals destroyed: 19 cattle.
Appraisement of animals, \$515.00.
44. John F. Newman, Franklin township, Snyder county.
Inspected and quarantined by E. S. Deubler, November 18, 1908.
Mr. Newman was the tenant on the farm owned by Bower Brothers, and cattle purchased by E. Bower came in contact in field with cattle purchased from Wm. Troutman.
Animals destroyed: 13 cattle, 12 swine.
Appraisement of animals, \$485.00.
45. A. B. Kline, Franklin township, Snyder county.
Inspected and quarantined by S. C. Babson.
Mr. Kline's cow is believed to have become affected from the Newman or the Bower cattle by the agency of Mr. Kline, who walked through the pasture field occupied by these cattle in going to and from his work on his father's farm.
Animals destroyed: 1 cow.
Appraisement of animal, \$35.00.
46. Mrs. Ida Walter, Franklin township, Snyder county.
Inspected by S. C. Babson and E. P. Althouse. Quarantined by S. C. Babson, November 30th, 1908. This cow was exposed to contact with A. B. Kline's cow (No. 45).
Animals destroyed: 1 cow, 2 swine.
Appraisement of animals, \$52.00.
47. Thomas F. Reichenbach, Perry township, Snyder county.
Inspected by A. R. Potteiger and O. G. Noack. Quarantined by O. G. Noack November 21st, 1908.
Animals destroyed: 6 cattle, 9 swine.
Appraisement of animals, \$253.00.

48. Isaac Mengle, Chapman township, Snyder county.
 Inspected by O. G. Noack and A. R. Potteiger. Quarantined
 by O. G. Noack, November 19th, 1908.
 Mr. Mengle bought 1 steer of Wm. Troutman, Wednesday, Nov-
 ember 4, 1908.
 Animals destroyed: 12 cattle, 17 swine.
 Appraisement of animals, \$344.00.
49. Jacob Shallenberger, Monroe township, Juniata county.
 Inspected and quarantined by Geo. B. Jobson and E. P. Alt-
 house, November 18th, 1908.
 Mr. Shallenberger bought 9 steers November 5th, 1908, from
 William Troutman.
 Animals destroyed: 12 cattle.
 Appraisement of animals, \$240.00.
50. J. F. Heckman, Monroe township, Juniata county.
 Inspected and quarantined by Geo. B. Jobson and E. P. Alt-
 house, November 19th, 1908.
 Mr. Heckman had but one cow and it was a member of the
 herd of Jacob Shallenberger.
 Animal destroyed: 1 cow.
 Appraisement of animal, \$40.00.
51. M. B. Shirk, Monroe township, Juniata county.
 Inspected and quarantined by Geo. B. Jobson and E. P. Alt-
 house, November 19th, 1908.
 Mr. Shirk bought 4 steers of Wm. Troutman, November 5th,
 1908.
 Animals destroyed: 7 cattle, 6 swine.
 Appraisement of animals, \$226.75.
52. J. H. Lauver, Monroe township, Juniata county.
 Inspected and quarantined by Geo. B. Jobson and E. P. Alt-
 house, November 19th, 1908.
 Mr. Lauver bought a steer from Mr. Shirk. When this steer
 was examined, November 19th, it was found to have an
 old lesion and some of Mr. Lauver's cattle showed symptoms
 of recent infection.
 Animals destroyed: 11 cattle, 9 swine.
 Appraisement of animals, \$343.
53. A. H. Dinius, Middle Creek township, Snyder county.
 Inspected by E. S. Deubler, Oscar Carey and H. T. McNeal.
 Quarantined by E. S. Deubler, November 19th, 1908, and by
 H. T. McNeal, December 18th, 1908.
 Mr. Dinius purchased 3 steers and 1 heifer from Mr. Troutman
 on November 11th, 1908.
 Animals destroyed: 13 cattle, 10 swine.
 Appraisement of animals, \$672.
54. George Rine, Chapman township, Snyder county.
 Inspected by A. R. Potteiger, Leonard Pearson and O. G. Noack.
 Quarantined by Leonard Pearson November 18th, 1908.
 Mr. Rine bought 8 steers November 11th, 1908, from Wm. Trout-
 man.
 Animals destroyed: 23 cattle, 12 sheep, 11 swine.
 Appraisement of animals, \$921.27.

55. Arthur Bichart, Chapman township, Snyder county.
 Inspected by O. G. Noack and A. R. Potteiger, November 20th, 1908.
 Quarantined by O. G. Noack, November 20th, 1908.
 Mr. Bichart bought 1 heifer from Wm. Troutman November 10th, 1908.
 Animals destroyed: 1 heifer.
 Appraisement of animal, \$18.
56. J. M. Basom, Monroe township, Juniata county.
 Inspected by George B. Jobson and E. P. Althouse.
 Quarantined by George B. Jobson, November 19th, 1908.
 Mr. Basom bought 1 heifer and 4 steers from Wm. Troutman, November 11th, 1908.
 Animals destroyed: 6 cattle.
 Appraisement of animals, \$164.40.
57. H. N. Troutman, Upper Paxton township, Dauphin county.
 Mr. H. N. Troutman purchased 3 steers from Wm. Troutman, which were removed November 17th, 1908. Leonard Pearson telephoned from Selins Grove, Snyder county, to C. F. Keiter, November 19th, 1908, to go to Millersburg and place these steers in quarantine, which was done the same day.
 Quarantined by C. F. Keiter, November 19th, 1908, also by J. O. Reed, November 20th, 1908.
 Animals destroyed: 3 cattle, 2 swine.
 Appraisement of animals, \$126.
58. William Troutman, Chapman township, Snyder county.
 Inspected by Leonard Pearson, A. R. Potteiger, O. G. Noack and E. S. Deubler.
 Quarantined by Leonard Pearson November 18th, 1908.
 Mr. Troutman took to his farm several cattle, part of which he delivered to purchasers already mentioned, and part of which he kept in his herd.
 Animals destroyed: 11 cattle.
 Appraisement of animals, \$271.97.
 Total number of animals destroyed in the Middleburg outbreak: cattle, 140; swine, 78; sheep, 12.
 Total appraisement of animals, \$4,707.39.

NORRISTOWN OUTBREAK

Source: Putnam and Rood, of Sinclairville, N. Y., shipped from East Buffalo, N. Y., November 2nd, 1908, 22 cows and 4 calves to Ivan C. Walker, Norristown, Montgomery county, Pa. These cows were purchased from L. C. Faber, Marrilla, N. Y. They were originally yarded in the East Buffalo stockyards in pen No. 165, which is adjacent to the pens that were infected by cattle from Detroit. These cattle were unloaded in Norristown November 4th, at the unloading pens back of Walker's sale stable and were placed in cattle stalls in the basement of the sale stable. The cattle seemed to be out of condition; they were kept by Mr. Walker until November 11th, 1908, when they were sold. The 22 cows of this lot were sold November 11th as follows: Edwin Kelly, 10 cows; D. Davis, 7 cows; James Diamond, 1 cow; John Hassler, 1 cow; I. C. Walker, 3 cows. The day these cattle were received from Buffalo, some other cattle were sold from Walker's sale stable. The cattle that were sold were taken away, with a few possible exceptions,

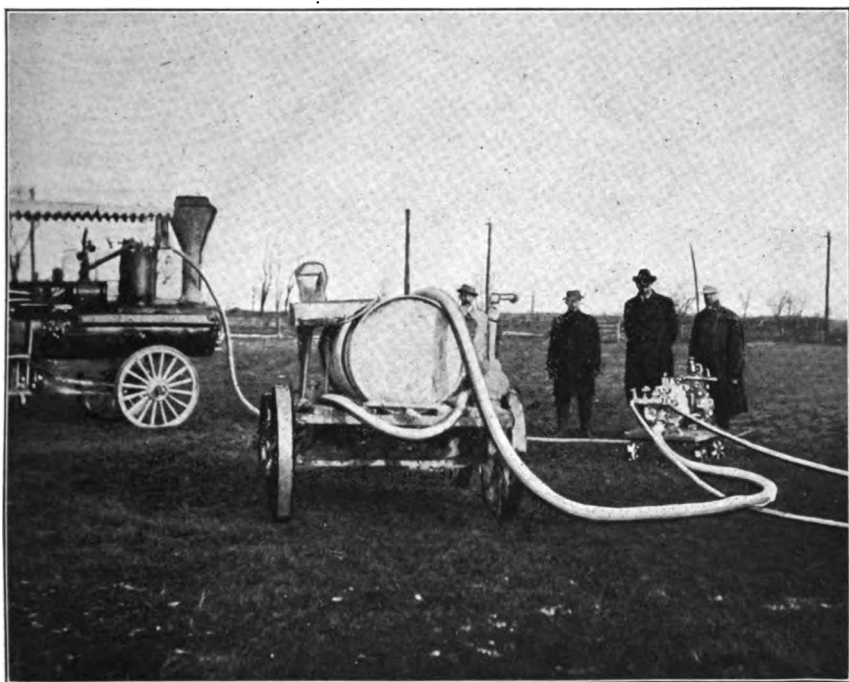


Figure 15. A steam disinfection pump mounted on a hand truck and actuated by steam from a traction engine, as planned and put in operation by Dr. Pearson. The tank carries disinfectant solution.

before the cattle from Buffalo were unloaded and put into the sale stable. A cow that was sold November 4th, 1908, appears to have carried infection; probably there was delay in delivering this cow and she may not have been removed from the sale stable before the cattle from East Buffalo were delivered. The sale held November 11th, 1908, included not only the New York State cows but also 20 other cattle. Of the 43 cattle sold that day all but 2 developed foot-and-mouth disease. November 18th, 1908, there was another sale of 47 cattle; these were passed through the undisinfected pens that had been occupied by the cattle sold the week before; 25 of these developed foot-and-mouth disease and 22 did not.

Knowledge of this outbreak came from Dr. S. W. Mathues, of Concordville, who discovered foot-and-mouth disease in the herd of Elias Brous, Delaware county, and reported by telephone to the office of the State Veterinarian, November 19th, 1908. It was found that Mr. Brous had purchased from Edwin Kelly a cow that Kelly had bought at Walkers' sale November 11th, 1908.

The lists of animals sold at Walker's Bazaar November 4th, November 11th and November 18th, were obtained November 20th by Dr. Pearson and all of the animals that had been exposed were very promptly traced and quarantined, either closely, under foot-and-mouth disease quarantine, or provisionally, for observation. The cows that Kelly had sold were traced and quarantined by Dr. E. M. Michener and Dr. S. W. Mathues.

59. Pasquali Blasetti, Upper Merion township, Montgomery county.
Inspected by J. S. Lacock and F. L. Stevens.
Quarantined by F. L. Stevens November 23rd, 1908.
Mr. Blasetti bought 1 cow from I. C. Walker on November 18th, 1908.
Animals destroyed: 1 cow.
Appraisement of animal, \$22.
60. H. B. McClees, Philadelphia, Philadelphia county.
Inspected by J. S. Lacock and S. H. Johnson.
Quarantined by S. H. Johnson November 22nd, 1908.
Mr. McClees purchased 1 heifer from I. C. Walker, November 18th, 1908.
Animals destroyed: 15 cattle.
Appraisements of animals, \$683.
61. E. S. Keely, Worcester township, Montgomery county.
Inspected by J. S. Lacock and F. H. McKeown.
Quarantined by F. H. McKeown November 23rd, 1908.
Mr. Keely purchased a bull from I. C. Walker November 19th, 1908.
Animals destroyed: 27 cattle.
Appraisement of animals, \$557.
62. Frank Ross and Company, Upper Merion township, Montgomery county.
Inspected by J. S. Lacock and F. L. Stevens.
Quarantined by F. L. Stevens November 21st, 1908.
This firm purchased 2 cows from I. C. Walker, November 18th, 1908.
Animals destroyed: 63 cattle.
Appraisement of animals, \$725.50.

- A bull belonging to John M. Rex and 2 cows, one the property of Lewis Collins, the other of John Thomas, were in the premises of Frank Ross and Company when the quarantine order was served and were, of course, not permitted to leave the Ross premises.
63. John M. Rex, Upper Merion township, Montgomery county.
Inspected by J. S. Lacock and F. L. Stevens.
Quarantined by F. L. Stevens, November 21st, 1908.
Mr. Rex's bull was exposed to a cow belonging to Frank Ross and Company on November 18th, 1908.
Animals destroyed: 1 bull.
Appraisement of animal, \$28.
 64. Lewis Collins, Upper Merion township, Montgomery county.
Inspected by J. S. Lacock and F. L. Stevens.
Quarantined by F. L. Stevens, November 28th, 1908.
Mr. Collin's cow was exposed November 18th, 1908, to cow purchased by Frank Ross and Company from I. C. Walker, November 18th, 1908.
Animals destroyed: 1 cow.
Appraisement of animal, \$50.
 65. John Thomas, Upper Merion township, Montgomery county.
Inspected by J. S. Lacock and F. L. Stevens.
Quarantined by F. L. Stevens, November 21st, 1908.
Mr. Thomas' cow was on the Ross premises and was exposed for about two hours to the cow purchased by Frank Ross and Company from I. C. Walker, November 18th, 1908.
Animals destroyed: 2 cattle.
Appraisement of animals, \$55.
 66. Alvin Haines, Plymouth township, Montgomery county.
Inspected and quarantined by J. S. Lacock, November 23rd, 1908.
Infection was carried to this herd by a cow which passed through the Walker stable in which 26 cattle were stabled, that were received from Buffalo on November 5th, 1908, by I. C. Walker.
Animals destroyed: 14 cattle.
Appraisement of animals, \$610.
 67. David Davis, Lower Providence township, Montgomery county.
Inspected by J. S. Lacock and A. E. Wright.
Quarantined by A. E. Wright, November 21st, 1908.
Mr. Davis purchased 7 cattle from I. C. Walker, November 11th, 1908.
B. J. Hilton, a tenant on the farm of Mr. Davis, was the owner of a goat which was destroyed on account of having been exposed to the Davis cattle.
Animals destroyed: 26 cattle, 1 goat, 7 swine.
Appraisement of animals, \$906.93.
 68. James Diamond, White Marsh township, Montgomery county.
Inspected by J. Stewart Lacock and F. H. Jones.
Quarantined by F. H. Jones, November 21st and 24th, 1908.

Mr. Diamond bought a cow and calf from I. C. Walker, November 11th, 1908, Mr. Diamond, after moving the cow and calf to his premises, removed all the cows that were on his farm but two to another farm, perhaps to conceal them from inspectors. The animals removed were discovered three days after the two cows were inspected and quarantined.

Animals destroyed: 10 cattle, 1 goat, 1 swine.

Appraisement of animals, \$310.

69. Serafino Lombardi, Plymouth township, Montgomery county. Inspected by J. Stewart Lacock and F. H. McKeown. Quarantined by F. H. McKeown, November 23rd, 1908. Mr. Lombardi bought a cow from I. C. Walker, November 11th, 1908.

Animals destroyed: 15 cattle.

Appraisement of animals, \$395.

70. Daniel Malloy, Lower Merion township, Montgomery county. Inspected by J. S. Lacock and F. L. Stevens. Quarantined by F. L. Stevens, November 24th, 1908. Mr. Malloy bought a cow from I. C. Walker, November 11th, 1908.

Animals destroyed: 1 cow.

Appraisement of animal, \$47.

71. Mrs. Charles B. Kelly, Plymouth township, Montgomery county. Inspected by J. S. Lacock and F. W. Ainsworth. Quarantined by F. W. Ainsworth, November 21st, 1908.

Infection was carried to this herd by a cow belonging to Mrs. Kelly that was placed in I. C. Walker's stable and exposed to the 26 cattle which came from Buffalo, November 5th, 1908. This cow was afterwards returned to the Kelly premises and placed with the Kelly herd, which afterwards developed foot-and-mouth disease.

Animals destroyed: 12 cattle.

Appraisement of animals, \$246.50.

72. Gaetano LeBue, Norristown, Montgomery county. Inspected by J. S. Lacock, F. L. Stevens and F. W. Ainsworth. Quarantined by F. W. Ainsworth and F. L. Stevens, November 22nd, 1908.

Mr. LeBue purchased one cow from I. C. Walker, November 11th, 1908.

Animals destroyed: 3 cattle.

Appraisement of animals, \$69.50.

73. I. C. Walker's farm, Norristown township, Montgomery county. Inspected by Leonard Pearson and J. S. Lacock. Quarantined by Leonard Pearson, November 20th, 1908.

Infection was carried to Mr. Walker's farm premises by three of the cattle received from Buffalo and unloaded at stockyards back of the sale barn, November 4th, 1908, and kept there until sold, November 11th, 1908.

Animals destroyed: 26 cattle, 25 swine.

Appraisement of animals, \$1,222.50.

74. John Haesler, 24th & Venango Sts., Philadelphia, Philadelphia county.
 Inspected by J. S. Lacock and S. H. Johnson.
 Quarantined by S. H. Johnson November 22nd, 1908.
 Mr. Haesler purchased two cattle from I. C. Walker November 11th, 1908.
 Animals destroyed: 16 cattle, 1 goat.
 Appraisement of animals, \$509.
75. Edwin Kelly, Williston township, Chester county.
 Inspected by E. M. Michener, Leonard Pearson, J. S. Lacock and George W. Famous.
 Quarantined by Leonard Pearson November 20th, 1908.
 Knowledge of infection in this herd was obtained through the report from Dr. S. W. Mathues, of Concordville, of foot-and-moth disease in the herd of Ellis Brous, Edgemont township, Delaware county. It was ascertained that the infection of Mr. Brous's herd came from cattle purchased from Edwin Kelly. It was found, as stated above, that the Kelly herd was infected from Walker's sale stables. Dr. Michener remained several days at the Kelly farm and was assisted by Mr. Kelly and his son in finding the cattle that they had sold after the arrival of the infected cattle from Norristown, and such cattle as had been exposed to contact with these cattle.
 Animals destroyed: 21 cattle, 2 swine.
 Appraisement of animals, \$1,106.
76. James Bernard, Whitepain township, Montgomery county.
 Inspected by J. S. Lacock and A. E. Wright.
 Quarantined by J. S. Lacock, December 4th, 1908.
 Infection was carried to this herd by a cow that Mr. Bernard purchased from C. B. Kelly (71), November 19th, 1908, and which was delivered to him November 20th, 1908. This cow while in Mr. Kelly's possession was exposed for a short time prior to November 16th, 1908, to I. C. Walker's cattle which were received from Buffalo November 5th, 1908. It is possible that infection was also carried to Mr. Bernard's herd by E. A. Rile who was present and examined without being clothed with the proper wearing apparel, the Edwin Kelly herd at Sugartown, November 23rd, the day it was destroyed. Dr. Rile, between November 23rd, the day on which the Kelly herd was destroyed, and December 3rd, examined on Mr. Bernard's premises the cow purchased by him from Mr. Kelly.
 Animals destroyed: 18 cattle.
 Appraisement of animals, \$900.
77. Alfred Dallet, Thornbury township, Delaware county.
 Inspected by G. W. Famous, A. N. Smith, E. M. Michener and S. W. Mathues.
 Quarantined by S. W. Mathues, November 21st, 1908.
 Mr. Dallet bought a cow from Edwin Kelly November 17th, 1908.
 Animals destroyed: 21 cattle, 19 swine.
 Appraisements of animals, \$1,428.50.
78. I. P. Thomas Estate, Thornbury township, Delaware county.
 Inspected by E. M. Michener, S. W. Mathues and J. D. DeRonde.
 Quarantined by S. W. Mathues, December 10th, 1908.

Infection was no doubt carried to this herd by Augustus Taney, manager, who visited the preimises of and examined the cattle belonging to Alfred Dallet on November 16th, 1908, after which he returned home and examined the cattle belonging to the Thomas estate. In addition to the above exposure, these cattle pastured in a field adjoining the one in which the Dallet cattle pastured. Again, chickens belonging to the two farms intermingled, and by so doing may have transmitted infection.

Animals destroyed: 55 cattle, 6 swine.

Appraisement of animals, \$3,138.

79. Thomas Kirk estate, Newton township, Delaware county.
Inspected by E. M. Michener, G. W. Famous, A. N. Smith, J. D. DeRonde.
Quarantined by E. M. Michener, November 21st, 1908.
Two cows were purchased by this estate from Edwin Kelly, November 17th, 1908.
Animals destroyed: 22 cattle, 1 goat.
Appraisement of animals, \$1,275.
80. J. Fred Lawton, Thornbury township, Delaware county.
Inspected by E. M. Michener, A. N. Smith, G. W. Famous, T. J. Kean and S. W. Mathues.
Quarantined by S. W. Mathues, November 22nd, 1908.
Mr. Lawton purchased a cow from Edwin Kelly November 16th, 1908.
Animals destroyed: 22 cattle, 3 swine.
Appraisement of animals, \$1,274.30.
81. George W. Proctor, Thornbury township, Delaware county.
Inspected by S. W. Mathues, E. M. Michener, G. W. Famous and J. Traum.
Quarantined by S. W. Mathues, November 22nd, 1908.
Infection was carried to Mr. Proctor's herd by a bull purchased by him from Edwin Kelly November 17th, 1908. This bull was in the possession of Mr. Kelly for a period of one month, and from November 11th, a period of six days, was exposed to the cattle purchased by Mr. Kelly from I. C. Walker November 11th, 1908.
Animals destroyed: 29 cattle.
Appraisement of animals, \$1,517.50.
82. Robert Yeardsley, Thornbury township, Delaware county.
Inspected by S. W. Mathues, E. M. Michener and J. Traum.
Quarantined by S. W. Mathues, November 21st, 1908.
Mr. Yeardsley purchased a cow from Edwin Kelly November 17th, 1908.
This cow was on Mr. Kelly's premises three weeks prior to the date on which it was sold, and from November 11th was exposed to the cattle purchased by Mr. Kelly from I. C. Walker. This cow was confined the night of November 17th in the barn in which Mr. Yeardsley's cattle were stabled and was removed early the following morning or the 18th.
Animals destroyed: 25 cattle, 2 swine.
Appraisement of animals, \$1,304.

83. Ellis L. Brous, Edgemont township, Delaware county.
 Inspected by G. W. Famous, S. W. Mathues, E. M. Michener,
 T. J. Kean and J. D. DeRonde.
 Quarantined by George W. Famous, November 21st, 1908.
 Mr. Brous purchased 3 cows and a bull from Edwin Kelly
 November 17th, 1908. The bull and 2 of the cows were pur-
 chased from I. C. Walker November 11th, 1908; the remaining
 cow being native. The source of infection and the history of
 this herd is of special interest from the fact that it was the
 first herd to be affected in Delaware county.
 Animals destroyed: 14 cattle.
 Appraisement of animals, \$780.
84. Elmer E. Miller, Edgemont township, Delaware county.
 Inspected by G. W. Famous, E. M. Michener, T. J. Kean and J.
 D. DeRonde.
 Quarantined by J. D. DeRonde and Geo. W. Famous, November
 21st, 1908.
 Mr. Miller bought three cows from Edwin Kelly, November 17th,
 1908. These were three of the cows purchased by Mr. Kelly
 from I. C. Walker, November 11th, 1908.
 Animals destroyed: 15 cattle, 2 swine.
 Appraisement of animals, \$949.50.
 Total number of animals destroyed in the Norristown outbreak:
 cattle, 475; swine, 67; goats, 3.
 Total appraisements of animals, \$20,109.73.

LANCASTER OUTBREAK

Source: Several consignments of cattle from East Buffalo, N. Y., to the Union stockyards, Lancaster, Penna. Shipments were made from East Buffalo stockyards to Lancaster during the time the Buffalo stockyards were infected, to B. N. Nolz, Z. Munich, F. C. Musser and M. M. Flickinger. These shipments made from October 17th to November 15th, 1908, comprised eighteen carloads. A large part of these cattle were from Michigan, a few from Indiana and a few from New York state. Three of the same shipments received a number of consignments of cattle from western New York state during the period referred to. It is not known that any of these New York state cattle that were shipped from points outside of Buffalo were exposed to foot-and-mouth disease, but it is possible that some of them may have been as they were within the Buffalo district and presumably were shipped in cars that were used in connection with the livestock traffic in the Buffalo stockyards.

It would seem to be probable that each of the four shippers named above, brought infected or exposed cattle from East Buffalo. The pens in the Lancaster stockyards are assigned to certain commission dealers, who use them exclusively; that is pens bearing certain numbers are used only for the business of certain commission dealers. It appears there was no great amount of infection in the Lancaster stockyards outside of the pens of the four commission men referred to, otherwise, cattle sold from pens of other dealers would have developed foot-and-mouth disease.

Through information obtained by Dr. B. F. Minich of Columbia, who had been instructed to trace and examine the cattle that had been shipped from East Buffalo and had been sold from the Lancaster stockyards. In the course of this investigation he learned

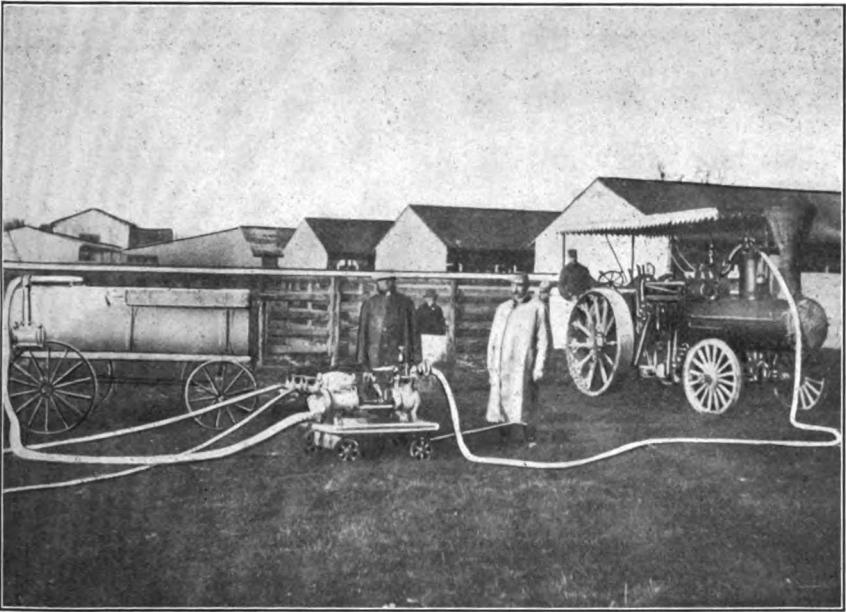


Figure 16. The same equipment shown in figure 15, as used at the stockyards at Lancaster. (The State Livestock Sanitary Board had a pump of this kind that was used in Lancaster but the one here shown was the property of the Stock Yards Company.)

of the infection in the herd of Jacob Hartman, November 18th, 1908. Infection in this herd was reported the next day by Dr. A. H. Metzger, of Millersville and Dr. B. H. Brady, of Lancaster, reported in a letter received November 10th, the existence of foot-and-mouth disease in the herd of G. F. Murry, of Creswell. Following this a large force of State and federal inspectors were brought into Lancaster county and other points of infection were discovered as described below.

85. Jacob Hartman, West Hempfield township, Lancaster county. Inspected by B. F. Minich, A. H. Metzger, D. E. Hickman, Joseph Johnson and J. E. Bender.

Quarantined by B. F. Minich, November 18th, 1908.

Mr. Hartman purchased a bull from Harry Binkley, Montville, Lancaster county, November 7th, 1908. This bull had been purchased by Binkley from M. M. Flickinger in the Lancaster stockyards about November 3rd. Mr. Hartman did not keep the bull as it was lame and he returned it to Binkley after he had had it about one week.

Animals destroyed: 22 cattle, 10 swine.

Appraisement of animals, \$1,154.

86. C. E. Greenawalt, West Hempfield township, Lancaster county. Inspected by D. E. Hickman, B. F. Minich, Joseph Johnson and J. E. Bender.

Quarantined by D. E. Hickman November 21st, 1908.

The bull that was returned to Harry Binkley from Joseph Hartman was sold to C. E. Greenawalt November 17th. When the bull was taken to the Hartman farm, it was driven to the cattle pens at the hotel at Mountville. The same day that this bull was purchased Mr. Greenawalt purchased 2 steers from Walter Dunlap, Mountville stockyards, Lancaster county.

Animals destroyed: 3 cattle.

Appraisement of animals, \$135.

87. A. Z. Kline, West Hempfield township, Lancaster county. Inspected by D. E. Hickman, B. F. Minich, J. Johnson and J. E. Bender.

Mr. Kline's cow was stabled on the Greenawalt farm.

Animals destroyed: 1 cow.

Appraisement of animal, \$55.

88. Dr. S. B. Koser, Drumore township, Lancaster county. Inspected by F. B. Minich, D. E. Hickman and J. E. Bender. Quarantined by B. F. Minich, November 20th, 1908.

Dr. Koser purchased two cows at Mountville from Harry Binkley November 8th, 1908, and had them driven to his farm near McCall's Ferry. They were stabled November 9th and 10th, at D. M. Witmer's farm near Safe Harbor. The two cows were purchased by Binkley from Jacob Hartman the same day they were sold to Dr. Koser; they were evidently infected in the Hartman herd.

Animals destroyed: 3 cattle.

Appraisement of animals, \$78.

89. Jonas B. Koser, Drumore township, Lancaster county.
 Inspected by B. F. Minich, D. E. Hickman and J. E. Bender.
 Quarantined by B. F. Minich November 20th, 1908.
 The cows and pigs belonging to J. B. Koser were stabled on the same premises and with the cattle of Dr. S. B. Koser.
 Animals destroyed: 1 cow, 2 swine.
 Appraisement of animals, \$65.
90. D. M. Witmer, Manor township, Lancaster county.
 Inspected by Joseph Johnson, B. F. Minich and J. E. Bender.
 Quarantined by J. E. Bender, November 21st, 1908.
 Two cows from the herd of Jacob Hartman, purchased by Harry Binkley and sold by him to Dr. S. B. Koser, were stabled on the premises and among the cattle of D. M. Witmer November 9th and 10th.
 Animals destroyed; 1 cow, 3 swine.
 Appraisement of animals, \$105.
91. George F. Murry, Manor township, Lancaster county.
 Inspected by C. J. Marshall, J. Johnson and J. E. Bender.
 Quarantined by C. J. Marshall November 20th, 1908.
 Mr. Murry purchased 3 cows from Harry Binkley November 10th, 1908. The cows were bought from two farmers in the neighborhood whose herds were subsequently inspected and found to be free from any evidence of foot-and-mouth disease. These cows were put in the cattle pens at the Mountville Hotel where they came in contact with the cows from the Hartman herd that were sold by Binkley to Dr. Koser (No. 87).
 Animals destroyed: 24 cattle, 17 swine.
 Appraisement of animals, \$425.17.
92. John H. Gamber, Manor township, Lancaster county.
 Inspected by H. B. Brady, C. J. Marshall and G. M. Graybill.
 Quarantined by C. J. Marshall November 21st, 1908.
 Mr. Gamber purchased 12 steers at the Lancaster stockyards October 28th, 1908, from B. N. Nolt. These steers were from a consignment of thirty-two head shipped from East Buffalo October 26th; they arrived in Lancaster the day they were sold to Gamber.
 Animals destroyed: 18 cattle.
 Appraisement of animals, \$730.
93. H. B. Ament, Manor township, Lancaster county.
 Inspected by H. B. Brady, C. J. Marshall and G. M. Graybill.
 Quarantined by C. J. Marshall November 21st, 1908.
 Mr. Ament is employed by Mr. Gamber. His cattle were kept on the same premises as those of Gamber's. (No. 92).
 Animals destroyed: 4 cattle, 5 swine.
 Appraisement of animals, \$265.
94. Dr. E. E. Kindig, West Hempfield township, Lancaster county.
 Inspected by B. F. Minich and J. E. Bender.
 Quarantined by B. F. Minich November 29th, 1908.
 Dr. Kendig purchased a bull at the Lancaster stockyards November 4th, from B. N. Nolt. This bull was of a consignment from East Buffalo that was shipped from there November 2d, 1908, and that arrived in Lancaster November 4th, 1908.
 Animals destroyed: 6 cattle, 3 swine.
 Appraisement of animals, \$330.

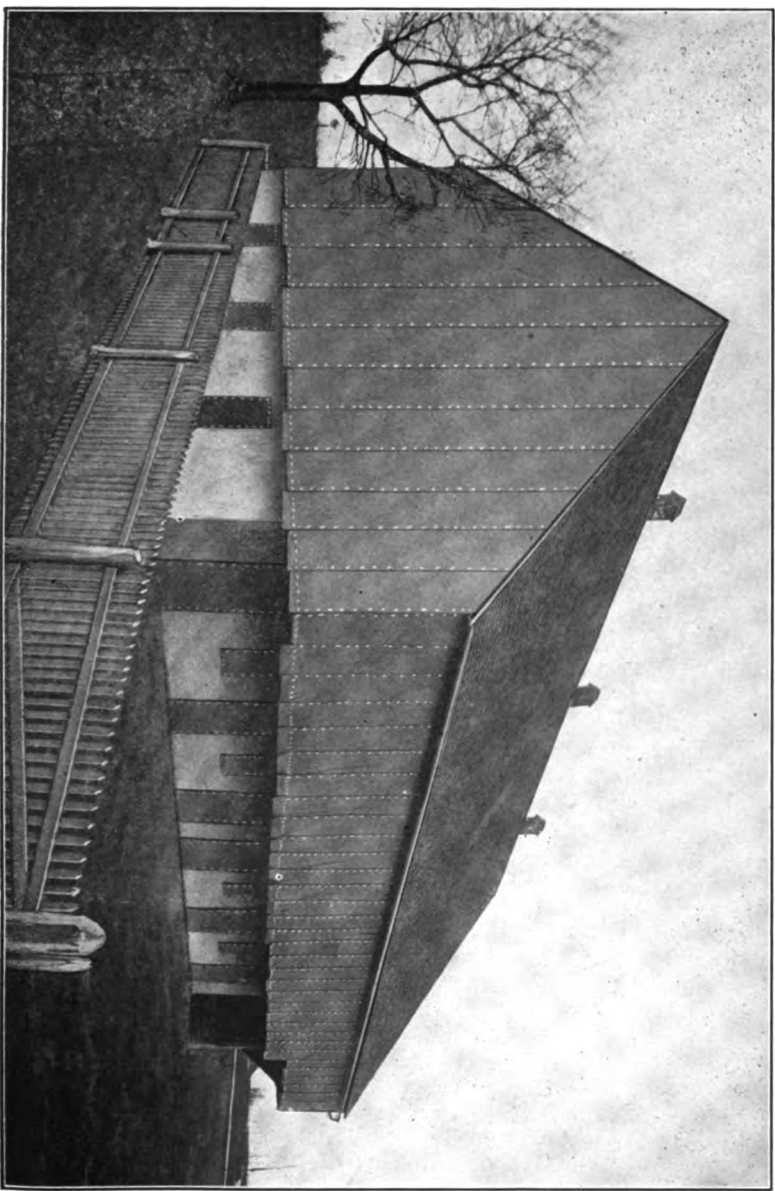


Figure 17. A drawing modified from a photograph to show how the sides of a loosely constructed building may be covered with paper and how the doors and windows may be covered to prepare for disinfection by fumigation. In this case, the attempt at fumigation was a failure because the gas rapidly escaped through the shingled roof. The serviceable disinfection in this instance was accomplished with a State steam pump.

95. H. B. Esbenshade, Manheim township, Lancaster county.
Inspected and quarantined by G. M. Graybill November 22nd, 1908.
Mr. Esbenshade bought seven steers and two bulls from Z. Minich November 4th, 1908. These steers were shipped from Buffalo November 2nd, and arrived at the Lancaster stockyards November 4th, 1908.
Animals destroyed: 20 cattle, 8 swine.
Appraisement of animals, \$984.
96. Amos B. Herr, East Hempfield township, Lancaster county.
Inspected by G. M. Graybill, A. W. Wier and Leonard Pearson.
Quarantined by G. M. Graybill November 22nd, 1908.
Mr. Herr purchased from Z. Minich one heifer and nine steers at the Lancaster stockyards. The heifer was purchased late in October and the steers were purchased November 4th. These cattle had been shipped from Michigan by way of Buffalo.
Animals destroyed: 26 cattle, 4 swine.
Appraisement of animals, \$1,454.
97. Charles Hambright, Manheim township, Lancaster county.
Inspected by W. B. M. Strayer, C. M. Wright, A. W. Wier and Leonard Pearson.
Quarantined by C. M. Wright November 29th, 1908.
Mr. Hambright's cattle are located on a farm about a mile east of the Lancaster stockyards. Mr. Hambright kept a large number of pigeons. No cattle were brought to the farm after August 1st. November 10th, 1908, Mr. Hambright purchased a fat hog at the Lancaster stockyards and killed it the same day for his own use. There is a fountain of good drinking water in the barnyard where the Hambright cattle were kept. It is said that it has been a regular custom of the employes of the railroad in that vicinity to obtain their drinking water in this place. As the fountain is quite near where the cars are shifted, manure may be shaken from the cars, dropped on the tracks and be carried into the barnyard by the considerable traffic. The exact mode of infection in this case was not determined. When the disease was reported November 28th, the symptoms were in the earlier and acute stage. The infection may have been brought to the farm from one to two weeks before the outbreak was reported.
Animals destroyed: 14 cattle, 17 swine.
Appraisement of animals, \$687.
98. John R. Leaman, East Lampeter township, Lancaster county.
Inspected by D. E. Hickman, Francis Falls, A. W. Wier, John Reichel, Leonard Pearson, J. H. Turner and Joseph Johnson.
Quarantined by D. E. Hickman, January 17th, 1909.
Infection in this herd was reported to the office of the State Livestock Sanitary Board at Lancaster, by W. B. M. Strayer, January 17th, 1909. When examined the same day the cattle were found to be afflicted with foot-and-mouth disease in all stages. The herd had apparently been infected about three weeks at the time of inspection. No animal had recently been taken to this herd excepting a cow moved on permit December 26th, 1908. The origin of this cow was known. After

the disease appeared in Mr. Leaman's herd, the herd from which the cow came was inspected as were other herds in that neighborhood, and other cattle that had been in contact with this cow before it reached Leaman's farm, and no evidence of foot-and-mouth disease was discovered in any of these animals. Moreover, this cow showed evidence of more recent disease as did some other cows of the Leaman herd.

Mr. Leaman's farm is about one mile across country from the Hambricht farm. The two farms are separated by the Conestoga creek. Mr. Hambricht (No. 96), kept a large flock of pigeons. An effort was made to destroy these pigeons when the cattle were killed, but this was not possible. They were shot at and many of them flew away. Mr. Leaman also kept a large flock of pigeons. These nested all around the buildings; under the eaves. It seems to be probable that the infection was carried from the Hambricht farm to the Leaman farm by the pigeons.

Animals destroyed: 28 cattle, 5 swine.

Appraisalment of animals, \$1,490.

99. John N. Landis, East Lampeter township, Lancaster county. Inspected and quarantined by Leonard Pearson and S. E. Bennett, January 18th, 1909.

The Landis cattle were watered from a brook a quarter of a mile below the Leaman premises. The young man on Mr. Landis' farm worked at corn shedding at the Leaman farm two or three weeks before. There are many pigeons on the Landis premises as well as on the Leaman farm. During the two weeks prior to the occurrence of the disease and following a heavy snow storm, Mrs. Landis observed strange pigeons in the cow stable eating from the mangers. The state of the disease at the time of the first inspection was very recent. The cows showed perfectly fresh vesicles and one a high temperature. It is clear that the Landis cattle were infected after the Leaman cattle, and everything points to the carrying of infection from the Leaman farm to the Landis farm.

Animals destroyed: 4 cows.

Appraisalment of animals, \$230.

100. Irwin H. Forry, Manheim township, York county. Inspected by W. L. Herbert, W. C. Herrold, J. F. Fahey and G. M. Graybill.

Quarantined by W. C. Herrold November 28th, 1908.

Twenty-four steers were purchased by B. F. Forry, father of E. H. Forry, from F. C. Musser at the Lancaster stockyards, October 26th, 1908. These cattle were shipped via P. R. R., to Spring Grove; unloaded October 27th, and driven to Mr. Forry's farm. The cattle were not known to be affected at the time of purchase.

Animals destroyed: 30 cattle, 9 swine.

Appraisalment of animals, \$1,334.

Total number of animals destroyed in Lancaster outbreak: cattle, 205; swine, 86.

Total appraisalment of animals, \$9,521.17.

APPENDIX A

Commonwealth of Pennsylvania

STATE LIVESTOCK SANITARY BOARD

Notice of Quarantine

WARNING

ENTRANCE FORBIDDEN

Cattle affected with or believed to have been exposed to

APHTHOUS FEVER OR CONTAGIOUS FOOT-AND-MOUTH DISEASE

are (or have been) on these premises and a quarantine has been established of the cattle, hogs, sheep, and goats, and the premises, including buildings, yards, pens and fields that such animals occupy or have occupied. All unauthorized persons are forbidden to enter the quarantined premises or to come in contact with the diseased or exposed animals, or with any object or thing that may have been contaminated by or from such animals. The following is an extract from the Act of Assembly, approved May 21st, 1895:

Section 5. That any person or persons wilfully violating any of the provisions of this act, or any regulation of the State Livestock Sanitary Board, or wilfully interfering with officers appointed under this act, shall be deemed guilty of a misdemeanor, and shall, upon conviction, be punished by a fine not exceeding one hundred dollars or by imprisonment not exceeding one month or both at the discretion of the court.

LEONARD PEARSON,
State Veterinarian.
Secy. State Livestock Sanitary Board.

APPENDIX B

Commonwealth of Pennsylvania

STATE LIVESTOCK SANITARY BOARD

ORDER OF QUARANTINE

Foot-and-Mouth Disease

To

.....P. O.,

.....Co., Pa.

You are hereby notified that in accordance with the provisions of the Act of May 21st, 1895, and the regulations of the State Livestock Sanitary Board, you are required to isolate and place in quarantine on your premises, the following described animal.....:

.....

under suspicion of being affected with or having been exposed to the disease known as apthous fever or foot and mouth disease, a dangerous, contagious disease.

You are hereby forbidden to remove from said premises any of the above described animals, or any animal, material, article or thing that is likely to or may convey contagion.

This quarantine remains in force until it is revoked by authority of the State Livestock Sanitary Board.

You will be governed by the following regulations of the State Livestock Sanitary Board.

1. Cattle, sheep, goats and swine under quarantine on account of foot and mouth disease must be kept absolutely and wholly separate and apart from all other animals and all other animals must be kept wholly apart from quarantined animals.

2. The quarantine is extended to animals other than those originally quarantined, if they are permitted to come in contact with quarantined animals or to enter quarantined premises.

3. Persons caring for animals quarantined on account of foot and mouth disease must not, under any circumstances, come in contact, either direct or indirect, with other cattle, sheep, goats or swine.

4.. No animals shall be allowed to run loose or free on or near quarantined premises. This regulation covers domesticated animals of all kinds, including dogs, cats and poultry.

5. If there are pigeons on a farm or on premises quarantined on account of foot and mouth disease the pigeons shall be killed or they shall be confined on the said quarantined premises until released by authority of an agent of the State Livestock Sanitary Board.

6. If domesticated animals, dogs, cats, poultry or pigeons are kept at liberty or allowed to go free so near quarantined animals or premises that they constitute, in the estimation of an agent of the State Livestock Sanitary Board, a menace to the efficiency of the quarantine, such animals may be confined and placed under quarantine.

7. Milk from diseased or exposed cows or milk produced in or on quarantined premises shall be placed in milk cans, or other receptacles that have covers that fit tightly. Formaldehyde shall be added to such milk in the proportion of one pint of formaldehyde to thirty quarts of milk. The cover shall then be placed on the can or receptacle and the milk and the formaldehyde shall be allowed to remain in the cow stable, undisturbed, for not less than eight hours, after which it is to be poured into a pit dug in the manure pile and covered over with manure. The agent of the State Livestock Sanitary Board may authorize other safe methods for disposing of such milk.

8. There shall not be removed from quarantined premises, without specific permission in writing, from an authorized representative of the State Livestock Sanitary Board, any material, article or thing that is likely to or that may convey contagion, and, in particular, there shall not be removed from such premises any milk or milk products; diseased or quarantined animals; hay, straw, fodder, grain or other feed; manure, stable or milk utensils.

9. Horses that are to be used must be kept in a stable separate from the buildings and premises under quarantine. Before removal to such stable, the horses shall be thoroughly cleaned, their feet and legs shall be disinfected and the halters and harness shall be disinfected, under the supervision of an agent of the State Livestock Sanitary Board.

10. Persons caring for quarantined animals must not convey or permit the conveyance, from the quarantined premises, or articles, materials or things that have been in contact with or are contaminated by or that may have been contaminated by diseased animals.

11. All unauthorized persons are forbidden to enter quarantined premises or to come in contact with diseased or exposed animals, or with any object or thing that may have been contaminated by, or from, such animals.

Your attention is directed to the following Section of the Act of May 21st, 1895:

"Section 5. That any person or persons, wilfully violating any of the provisions of this act, or any regulation of the State Livestock Sanitary Board, or wilfully interfering with officers appointed under this act, shall be deemed guilty of misdemeanor, and shall upon conviction, be punished by a fine not exceeding one hundred dollars, or by imprisonment not exceeding one month, or both at the discretion of the court.

Served or delivered }
190 .. } *State Veterinarian.*
 By
Agent of the State Livestock Sanitary Board

.....
 To be Detached and Returned to State Veterinarian.

I have this day delivered to a quarantine
 order covering the following animals:
 the property of of P. O., ... Co., Pa.

Agent, State Livestock Sanitary Board.

Date.....190....

APPENDIX C

Commonwealth of Pennsylvania

STATE LIVESTOCK SANITARY BOARD

Circular No. 14

Instructions to Agents of the State Livestock Sanitary Board Who
 are Engaged in Work Upon the Control of Foot
 and Mouth Disease.

Harrisburg, Pa., November 11, 1908.

1. If there is any reason to suspect that any animals are affected with foot and mouth disease in a herd that is to be inspected, the veterinarian should wear special clothing provided for this purpose. If by chance, a veterinarian should come in contact with an animal affected with foot and mouth disease when he is not clad as described below, he must at once disinfect his hands, boots and

clothing as well as possible and remain away from the vicinity of healthy cattle, sheep, goats or swine until after all of his clothing has been disinfected by fumigation.

2. Special clothing for use in the examination of animals affected with foot and mouth disease consists of a coat with a smooth rubber surface and so long as to come within ten inches of the ground; rubber boots, with extension tops to extend up the thighs; rubber gloves and a rubber hat or a cotton cap, which, after use, may be soaked in an antiseptic solution.

3. In using the special clothing mentioned in paragraph 2, the tops of the boots should be drawn up, the coat should be tightly buttoned and the sleeves should be closed at the bottom over the wrist of the rubber gloves before the veterinarian enters the premises where the infected animals may be. Before entering the premises, it is invariably necessary to provide and have ready for use a solution of bichloride of mercury, one part to three hundred. After entering the infected premises, the rubber coat must not be unbuttoned (nothing can be taken from the pockets), until after the clothing is disinfected as provided in paragraph 4.

4. When the veterinarian leaves the building or pen occupied by the affected animal or animals he should first disinfect his rubber gloves and the entire surface of the coat by washing with a sponge and the antiseptic solution. It will be convenient to have help to wash off the back, shoulders and sides of the coat. Special attention should be given to the removal of infectious material that may have lodged on the front of the coat or the sleeves. After the coat has been cleaned, it may be removed, then the boots should be washed from the top down to and including the soles and heels, after which the hat should be washed or soaked in the antiseptic solution. Lastly, the rubber gloves should be removed and the clothing put away in a suitable case or bag. The whole kit is to be fumigated with formaldehyde at the close of the day's work.

5. The typical cases of foot and mouth disease cannot fail to be recognized but as the evidence is in some cases indistinct (early in the disease, mild cases, recovering animals), certain special points are here mentioned. The discovery of mild cases is very important as these convey infection and may not have been suspected by the purchaser or owner. In examining cattle for evidence of foot and mouth disease, it is well to begin by taking the temperature. The febrile stage of the disease is very short, however, and sometimes immediately upon the formation of vesicles, in other cases very shortly thereafter, the temperature falls almost or quite to normal. The vesicles should be looked for closely as unless large they may be unobserved. Vesicles may sometimes be found well back on the tongue, near the thick portion, on the side or on the upper surface when they are not numerous in the front of the mouth or upon the lips. In many cases there is evidence of irritation of the mucous membrane of the nose and eyes. The feet are usually affected, but the eruption is not always so severe as to cause marked lameness and evidence of disease of the feet, at the time of the inspection, may consist only in a slight swelling and moisture of the skin in front of and immediately above the cleft of the hoofs. When the foot is picked up, red, cracked, ulcerated or, perhaps, only abnormally moist skin may be found between the hoofs.

Where the animal has been long affected and is partly or almost recovered one should search carefully for defects in the mucous membrane, especially upon the back and tip of the tongue, the pad, inside and upper lip and the gum border back of the incisors. The feet and teats should also be closely examined in such cases. The condition of the mucous membrane that reveals the preexistence of lesions of foot and mouth disease may consist in only a very slight depression with an abrupt border; sometimes this is of considerable area. The appearance is as though the epithelium had been peeled off. Ulcers that have healed show for some time as areas of dirty yellow color, irregular shape and uneven surface; they are most numerous on the pad, the tips of the tongue, inside the upper lip, the lip borders and on the hard palate.

6. If any affected animals are found in a herd, or if animals from an infected herd have been brought into the herd under inspection, the entire herd is to be placed in quarantine by the service of a quarantine notice upon the owner or his representative. Official placards (notices of quarantine), are to be posted wherever the disease is found or is known to have existed and are to remain until the premises are disinfected and released from quarantine.

7. Agents of the State Livestock Sanitary Board will explain to herd owners the necessity for the stringent quarantine that is required. Owners and those in charge of infected herds and premises should also be very fully instructed as to the necessity for observing all of the regulations governing quarantine that are printed on the quarantine blank.

8. When the cattle are quarantined, each is to be tagged and each is to be described in the first report following the quarantine of the herd.

9. Inquiry should be made in all cases as to the source of the infection. As much information on this point as possible should be secured, with all obtainable details as to dates, place of origin, name of seller, route of shipment, initials and numbers of cars, description of animals, etc. The road over which the first infected animal passed on its way to the infected herd should be ascertained, together with such other information as can be had in relation to the possibility of contact on the way to the infected farm. Careful inquiry should also be made as to whether any animals had been sold from the infected herd or whether outside animals (cattle, sheep, goats or swine), have come in contact with the members of the infected herd since the arrival of the animal which is presumed to have introduced the infection.

10. When quarantine herds or premises are reinspected, the veterinarian should ascertain how thoroughly the quarantine regulations are being observed. Defects in observation should be pointed out to the owner of the premises or person in charge, and should be mentioned in the veterinarians' report.

11. From time to time, the tagged cattle in quarantine herd should be looked up and compared, as to descriptions and tag numbers, with the original list.

12. All reports or rumors of the existence of foot and mouth disease in other places should, if possible, be investigated; if this cannot be done they should be reported.

13. Sheep, goats and swine on infected premises are to be quarantined and subjected to regulations and conditions similar to those governing cattle.

14. Veterinarians undoubtedly will work in full sympathy, and they should use every effort to work in co-operation and complete harmony with the owners of infected herds. The very dangerous nature of the disease and the enormous losses that are sure to result if its prevalence continues (as all the history of this disease teaches, in this and other countries), should be explained to livestock owners.

LEONARD PEARSON,
State Veterinarian.

APPENDIX D

Commonwealth of Pennsylvania

STATE LIVESTOCK SANITARY BOARD

Harrisburg, Pa., November 13, 1908.

WHEREAS: Aphthous fever or foot and mouth disease has occurred among cattle in the counties of Montour, Northumberland and Union, and it is deemed that cattle in the county of Columbia may have been exposed, and

WHEREAS: Foot and mouth disease is a dangerous and highly contagious disease affecting cattle, sheep, goats and swine, and it is of very great importance to the livestock interests of the State and nation that this outbreak shall be controlled and eradicated, and

WHEREAS: The State Livestock Sanitary Board is charged with the control of contagious diseases among domestic animals in Pennsylvania and is authorized and empowered by the Act of May 21st, 1895, to establish, maintain, enforce and regulate such quarantine and other measures relating to the movements of animals and their products as may be necessary for carrying out the purposes of the said Act, therefore,

IT IS HEREBY ORDERED, First: To prevent the spread of foot and mouth disease, and to aid in its eradication, no cattle, sheep, goats or swine shall be moved from or out of the counties of Columbia, Montour, Northumberland and Union.

Second: No cattle, sheep, goats or swine shall be moved into any one of the counties of Columbia, Montour, Northumberland or Union except for immediate slaughter.

All transportation companies, cattle dealers, farmers and others are called upon to assist the State Livestock Sanitary Board in the enforcement of the foregoing order of quarantine so that this outbreak of disease may be eradicated with the least possible loss and in the shortest possible time.

APPENDIX E

PENNSYLVANIA STATE LIVESTOCK SANITARY BOARD

Foot and Mouth Disease—Inspection Report

County, ...
 Township, ...
 Farm Owner, ...
 Farm Occupant, ...
 P. O. Address, ...
 Number and kind of Cattle, Sheep, Goats and Swine, ...

 Were all of the above animals seen and examined?
 Give number and origin of all animals brought to farm since Octo-
 ber 20th, 1908, ...

 Give number and destination of all animals removed from farm since
 October 20th, 1908, ...

 Has anything been brought from infected premises to this farm?....
 Any history or present evidence of foot and mouth disease?
 Date.....190
 Veterinary Inspector.

APPENDIX F

Commonwealth of Pennsylvania

STATE LIVESTOCK SANITARY BOARD

Harrisburg, November 24th, 1908.

WHEREAS: Aphthous fever or foot and mouth disease has oc-
 curred among cattle in the counties of Clinton, Union, Snyder,
 Juniata, Montour, Northumberland, Dauphin, York, Lancaster, Le-
 high, Montgomery, Chester, Delaware and Philadelphia, and

WHEREAS: Foot and mouth disease in a dangerous and highly contagious disease affecting cattle, sheep, goats and swine, and it is of very great importance to the livestock interests of the State and nation that this outbreak shall be controlled and eradicated, and

WHEREAS: The State Livestock Sanitary Board is charged with the control of contagious diseases among domestic animals in Pennsylvania and is authorized and empowered by the Act of May 21st, 1895, to establish, maintain, enforce and regulate such quarantine and other measures relating to the movements of animals and their products as may be necessary for carrying out the purposes of the said Act, therefore,

IT IS HEREBY ORDERED, First: To prevent the spread of foot and mouth disease, and to aid in its eradication, no cattle, sheep, goats or swine shall be moved from or out of the counties of Clinton, Union, Snyder, Juniata, Montour, Northumberland, Dauphin, York, Lancaster, Lehigh, Montgomery, Chester, Delaware or Philadelphia.

Second: No cattle, sheep, goats or swine shall be moved into any one of the counties of Clinton, Union, Snyder, Juniata, Montour, Northumberland, Dauphin, York, Lancaster, Lehigh, Montgomery, Chester, Delaware or Philadelphia except for immediate slaughter.

All transportation companies, cattle dealers, farmers and others are called upon to assist the State Livestock Sanitary Board in the enforcement of the foregoing order of quarantine so that this outbreak of disease may be eradicated with the least possible loss and in the shortest possible time.

APPENDIX G

Commonwealth of Pennsylvania

STATE LIVESTOCK SANITARY BOARD

Harrisburg, November 24th, 1908.

RESOLVED: On account of the prevalence of foot and mouth disease a quarantine is hereby established of all public roads and highways in so far as concerns the use of such public roads and highways for the driving, movement or transportation of cattle, sheep, goats or swine in the following named counties to-wit: Clinton, Union, Snyder, Juniata, Montour, Northumberland, Dauphin, York, Lancaster, Lehigh, Montgomery, Chester, Delaware and Philadelphia.

IT IS FORBIDDEN to drive, transport or move cattle, sheep, goats or swine over or upon public roads or highways in the counties aforesaid except upon specific permission in writing from an authorized agent of the State Livestock Sanitary Board.

Permits for driving, transporting or moving cattle, sheep, goats or swine over the public roads or highways must be taken out in advance and must be held by the person in charge of and accompanying such animals, and must be kept available for inspection.

All sheriffs, constables, police officers and officers of the law are called upon to assist in the enforcement of these quarantine regulations.

APPENDIX H

Commonwealth of Pennsylvania

STATE LIVESTOCK SANITARY BOARD

Harrisburg, Pa., November 30, 1908.

IT IS HEREBY ORDERED: That no hides or skins which have been removed from the carcasses of cattle (including calves), sheep, other ruminants and swine in the counties of Clinton, Union, Snyder, Juniata, Montour, Northumberland, Dauphin, York, Lancaster, Lehigh, Montgomery, Chester, Delaware and Philadelphia, shall be shipped or transported from these counties to any other section of the State unless they are previously immersed in a five per cent solution of carbolic acid, or a 1 to 1,000 solution of bichloride of mercury, or a three per cent. solution of formalin, containing a thirty-seven per cent. solution of formaldehyde.

This immersion must take place in the presence of an agent of the State Livestock Sanitary Board or of an inspector of the U. S. Bureau of Animal Industry, and no hides or skins of the animals mentioned above shall be accepted for shipment without a certificate signed by an agent of the State Livestock Sanitary Board or an employe of the U. S. Bureau of Animal industry that they have been disinfected as required by this order.

Harrisburg, Pa., December 8, 1908.

SUPPLEMENTAL TO THE ORDER OF NOVEMBER 30, 1908, IN RELATION TO THE SHIPMENT OF HIDES AND SKINS OUT OF THE COUNTIES UNDER FOOT-AND-MOUTH DISEASE QUARANTINE:

In addition to the methods for disinfecting hides and skins permitted by the above order, the following is approved, with the concurrence of the U. S. Bureau of Animal Industry: Dry sheep skins may be fumigated with formaldehyde gas instead of being dipped. In this case, the skins are to be hung loosely on racks or lines, so that the gas may penetrate between them; they shall be exposed

to fumigation in a tight room; formaldehyde gas shall be liberated from formaldehyde solution by the use of permanganate of potash; for each 1,000 cubic feet capacity the disinfecting chamber there shall be used 20 ounces of formaldehyde solution (37-40 per cent.), and 16 2-3 ounces of permanganate of potash; exposure to fumigation shall continue not less than eight hours.

APPENDIX I

Commonwealth of Pennsylvania

STATE LIVESTOCK SANITARY BOARD

Harrisburg, Pa., December 22nd, 1908.

The following order was adopted by the State Livestock Sanitary Board at Harrisburg this date, to become effective December 28th, 1908, and to supersede the two orders adopted by this Board on November 24th, 1908:

WHEREAS: Aphthous fever, or foot-and-mouth disease, has occurred among cattle in the counties of Clinton, Lycoming, Union, Snyder, Juniata, Montour, Northumberland, Perry, Dauphin, York, Lancaster, Lehigh, Montgomery, Chester, Delaware and Philadelphia, and

WHEREAS: The State Livestock Sanitary Board is charged with the control of contagious diseases among domestic animals in Pennsylvania and is authorized and empowered by the Act of May 21st, 1895, to establish, maintain, enforce and regulate such quarantine and other measures relating to the movements of animals and their products as may be necessary for carrying out the purposes of the said Act, therefore,

IT IS HEREBY ORDERED, To prevent the spread of foot-and-mouth disease and to aid in its eradication, no cattle, sheep, goats or swine shall be moved from or out of the following counties or townships to any other part of the State: the counties of Montour, Northumberland, Lancaster, Lehigh, Montgomery, Chester, Delaware and Philadelphia; in Clinton county, the townships of Porter, Lamar, Wayne, Dunstable, Woodward, Castanea, Bald Eagle and Allison, the boroughs of Mill Hall and Flemington, and the city of Lock Haven; in Lycoming county, the seventh and eleventh wards of the city of Williamsport; Union county, except Hartley and Lewis townships; Snyder county, except West Beaver and Spring townships; that part of Juniata county situated north and east of the Juniata river, except Fermanagh and Walker townships; that part of York county situated south and east of Conewago creek; in Perry county, the townships of Liverpool and Buffalo; and in Dauphin county, the

townships of Upper Paxton and Halifax; Provided, however, That cattle, sheep, goats or swine may be moved from one point to another within the aforementioned quarantined era upon permission in writing from an agent of the State Livestock Sanitary Board, expressly authorized to issue such permits.

IT IS FORBIDDEN to drive, transport or move cattle, sheep, goats or swine over or upon public roads or highways in the counties and townships aforesaid except upon specific permission in writing from an agent of the State Livestock Sanitary Board expressly authorized to issue such permits.

Permits for driving, transporting or moving cattle, sheep, goats or swine over the public roads or highways must be taken out in advance and must be held by the person in charge of and accompanying such animals, and must be kept available for inspection.

All sheriffs, constables, police officers and officers of the law are called upon to assist in the enforcement of these quarantine regulations.

APPENDIX J

Commonwealth of Pennsylvania

STATE LIVESTOCK SANITARY BOARD

Harrisburg, Pa., January 5th, 1909.

The following order was adopted by the State Livestock Sanitary Board at Harrisburg this date to supersede the order adopted by this Board on December 28th, 1908:

WHEREAS: The Secretary of the U. S. Department of Agriculture has issued amendment No. 9, effective today, modifying B. A. I. order No. 156, quarantining Pennsylvania on account of foot-and-mouth disease, in so far as to permit the movement of cattle, calves, sheep, and swine for immediate slaughter, of hay, straw, or similar fodder, and of hides, skins, and hoofs of cattle, sheep, other ruminants and swine from any point in the State of Pennsylvania, except from the counties of Philadelphia, Delaware, Chester, Lancaster, Dauphin, Lebanon, Berks, Montgomery, Bucks, Lehigh, Northampton, Carbon, Schuylkill, Luzerne, Columbia, Montour, Northumberland, Lycoming, Clinton, Center, Union, Snyder, Mifflin, Juniata and Perry, and that portion of York county which lies east and south of Conewago creek, to any point located in any other State or Territory or the District of Columbia, without inspection or certification, provided the authorities of the State, Territory, or the District of Columbia to which the animals are destined have previously signified their willingness to accept such animals; and provided, further, that animals moved under this amendment shall not be trailed into or driven through any one of the aforesaid counties or part of county

in the State of Pennsylvania, and that no cattle, sheep, other ruminants, or swine shall be trailed or driven from the State of Pennsylvania until permission for such movement has first been obtained from the Chief of the Bureau of Animal Industry, and

WHEREAS: The said amendment has been issued under the condition that the State Livestock Sanitary Board will establish and maintain a quarantine prohibiting the movement of cattle, sheep, other ruminants, and swine from or out of any of the counties or part of county aforementioned to any other part of the State; and of hay, straw, and similar fodder, or hides, skins, and hoofs of cattle, sheep, other ruminants and swine, unless disinfected, therefore,

IT IS HEREBY ORDERED that no cattle, sheep, other ruminants and swine shall be moved from the counties of Philadelphia, Delaware, Chester, Lancaster, Dauphin, Lebanon, Berks, Montgomery, Bucks, Lehigh, Northampton, Carbon, Schuylkill, Luzerne, Columbia, Montour, Northumberland, Lycoming, Clinton, Center, Union, Snyder, Mifflin, Juniata and Perry, and that portion of York county which lies east and south of Conewago creek to any other part of the State; and that no hay, straw, and similar fodder, or hides, skins and hoofs of cattle, sheep, other ruminants and swine shall be moved from the counties or part of county aforementioned to any other part of the State unless disinfected, and

IT IS FURTHER ORDERED, To prevent the spread of foot-and-mouth disease and to aid in its eradication, no cattle, sheep, goats, or swine shall be moved from or out of the following counties or townships to any other part of the State: the counties of Montour, Northumberland, Lancaster, Lehigh, Montgomery, Chester, Delaware and Philadelphia; in Clinton county, the townships of Porter, Lamar, Wayne, Dunstable, Woodward, Castanea, Bald Eagle and Allison, the Boroughs of Mill Hall and Flemington, and the city of Lock Haven; in Lycoming county, the seventh and eleventh wards of the city of Williamsport; Union county, except Hartley and Lewis townships; Snyder county, except West Beaver and Spring townships; that part of Juniata county situated north and east of the Juniata river, except Fermanagh and Walker townships; that part of York county situated east and south of Conewago creek; in Perry county, the townships of Liverpool and Buffalo; and in Dauphin county, the townships of Upper Paxton and Halifax; Provided, however, that cattle, sheep, goats, or swine may be moved from one point to another within the aforementioned quarantined area upon permission in writing from an agent of the State Livestock Sanitary Board expressly authorized to issue such permits.

IT IS FORBIDDEN to drive, transport or move cattle, sheep, goats or swine over or upon public roads or highways in the counties and townships mentioned in the paragraph immediately preceding, except upon specific permission in writing from an agent of the State Livestock Sanitary Board expressly authorized to issue such permits.

Permits for driving, transporting or moving cattle, sheep, goats or swine over the public roads or highways must be taken out in advance and must be held by the person in charge of and accompanying such animals, and must be kept available for inspection.

All sheriffs, constables, police officers and officers of the law are called upon to assist in the enforcement of these quarantine regulations.

APPENDIX K

Commonwealth of Pennsylvania

STATE LIVESTOCK SANITARY BOARD

Harrisburg, Pa., January 13, 1909.

The following order referring to the movement or transportation of hides and skins within the State was adopted by the State Livestock Sanitary Board today and is supplemental to the order adopted January 5th:

Hides or skins removed after January 1st from cattle, calves, sheep, or goats slaughtered in the counties of Philadelphia, Delaware, Chester, Lancaster, Dauphin, Lebanon, Berks, Montgomery, Bucks, Lehigh, Northampton, Carbon, Schuylkill, Luzerne, Columbia, Montour, Northumberland, Lycoming, Clinton, Center, Union, Snyder, Mifflin, Juniata and Perry, and that portion of York county which lies east and south of Conewago creek (and all other parts of Pennsylvania), may be moved to other parts of the State without disinfection provided the said hides or skins have not been in contact with hides or skins from animals slaughtered within the above described district before January 1st.

Hides or skins removed from animals slaughtered before January 1st and now stored in slaughter houses under the inspection of the U. S. Bureau of Animal Industry where the animals killed have come from unquarantined districts may be moved without disinfection.

Hides or skins from animals slaughtered before January 1st may be shipped without disinfection from points within the district in Pennsylvania quarantined by the U. S. Department of Agriculture to tanneries at any point within the State upon permission in writing from an authorized agent of the State Livestock Sanitary Board.

APPENDIX L

Commonwealth of Pennsylvania

STATE LIVESTOCK SANITARY BOARD

Harrisburg, Pa., February 24, 1909.

A. The following order was adopted by the State Livestock Sanitary Board this date to supersede previous orders issued on account of foot-and-mouth disease.

B. WHEREAS, The Secretary of the United States Department of Agriculture has issued a quarantine order (B. A. I. Order No. 157), to prevent the spread of foot-and-mouth disease in cattle, sheep, other ruminants and swine, effective on and after February 25th, 1909, which provides as follows:

U. S. DEPARTMENT OF AGRICULTURE,
OFFICE OF THE SECRETARY,
Washington, D. C., February 24, 1909.

1. In order to prevent the further spread of foot-and-mouth disease among livestock, I, JAMES WILSON, SECRETARY OF AGRICULTURE, under authority conferred by Section 1 of the Act of Congress, approved March 3, 1905 (33 Stat., 864), do hereby quarantine the following area to wit:

2. PENNSYLVANIA.

The entire County of PHILADELPHIA, including the City of Philadelphia.

The township of Hereford in BERKS County.

The townships of Milford, Richland and Springfield, and the boroughs included therein, in BUCKS County.

The townships of Marion and Walker in CENTRE County.

The townships of Pine Creek, Dunstable, Woodward, Allison, Bald Eagle, Porter, Lamar, Castanea and Wayne, the Boroughs of Mill Hall and Flemington, and the city of Lock Haven in CLINTON County.

The townships of Hemlock and Montour in COLUMBIA County.

The townships of Upper Paxton and Halifax, and the boroughs included therein, in DAUPHIN County.

The townships of East Whiteland, Tredyffrin, East Town, Willistown, East Goshen, West Town, Thornbury and Birmingham, and the boroughs and cities included therein, in CHESTER County.

The townships of Radnor, New Town, Marple, Haverford, Edgmont, Upper Providence, Thornbury, Middletown, Birmingham, Concord and Aston, and the boroughs of Glenolden and Media, in DELAWARE County.

That portion of JUNIATA County lying north and east of the Juniata River.

The townships of East Donegal, Ralpho, Penn, Warwick, West Earl, Upper Leacock, Leacock, East Lampeter, Manheim, East Hempfield, West Hempfield, Manor, Lancaster, Pequea, West Lampeter, Strasburg, Providence, Conestoga, Martick and Drumore, and the boroughs and the city of Lancaster included therein, in LANCASTER County.

All of LEHIGH County, excepting Hanover Township, and the boroughs of Catasauqua and West Bethlehem included therein.

The City of Williamsport in LYCOMING County.

The townships of Upper Hanover, Skippack, Towamensing, Upper Gwynedd, Lower Gwynedd, Whitepain, Worcester, Lower Providence, Upper Merion, Norriton, Plymouth, Upper Dublin, White Marsh, Lower Merion and Springfield, and all boroughs and cities included therein, and also that portion of the borough of Lansdale lying in Hatfield Township, in MONTGOMERY County.

The townships of Anthony, Limestone, Valley, West Hemlock, Cooper, Mahoning and Mayberry, and the borough of Danville, in MONTGOMERY County.

The township of Lower Saucon, and the boroughs of South Bethlehem and Hellertown, in NORTHAMPTON County.

The townships of Delaware, Lewis, Turbut, West Chillisquaque, East Chillisquaque, Point, Upper Augusta, Gearhart, Rush, Ralpho, Shamokin and Rockefeller, and the boroughs and cities included therein, in NORTHUMBERLAND County.

All of SNYDER County, excepting Monroe, Spring and West Beaver townships.

All of UNION County, excepting Lewis and Hartley townships.

The townships of Codorus and Manheim, and the boroughs included therein, in YORK County.

3. (Relates to New York.)

4. (Relates to Michigan.)

5. (Relates to Maryland.)

6. During the existence of this quarantine, the interstate or foreign transportation, movement, or trailing or driving of cattle, sheep, other ruminants and swine, or the interstate or foreign movement of hay, straw, similar fodder, hides, skins or hoofs, except as hereinafter otherwise provided, from the said areas herein quarantined in the States of Pennsylvania, New York, Michigan and Maryland, is hereby prohibited.

7. When interstate or foreign shipments by rail or boat of cattle, sheep, other ruminants and swine are made from and to points not included in the area herein quarantined, the said shipments shall not be unloaded within the quarantined area, except under the supervision of an employee of the Bureau of Animal Industry, and into pens which have been specially cleaned and disinfected and which have been designated and approved for that purpose by the Chief of the Bureau of Animal Industry.

8. Upon inspection and certification by an employee of the Bureau of Animal Industry, cattle, sheep, other ruminants and swine from points in the area herein quarantined, may be moved interstate, for immediate slaughter, provided the authorities of the State, Territory or District of Columbia, to which the animals are destined, have previously signified their willingness to accept them. When shipments by rail of cattle, sheep, other ruminants and swine, for immediate slaughter, are made from points in the area herein quarantined, the cars or crates containing them shall be sealed with Department seals, affixed by an employee of the Bureau of Animal Industry, before the said cars or crates shall be allowed to leave the area herein quarantined; and such shipments shall not be unloaded en route or at destination, within or outside of the area herein quarantined, except into reserved pens, which have been designated and approved for that purpose by the Chief of the Bureau of Animal Industry. The specially cleaned and disinfected pens provided for in Section 7 of this Order shall not be used for this class of shipments. When such shipments are unloaded en route, as herein-before provided, the cars shall, after reloading, be again sealed by an employee of the Bureau of Animal Industry, it being the purpose and intent of this provision that cars or crates containing such shipments shall remain sealed until the animals arrive at the place of slaughter.

9. Cattle, sheep, other ruminants and swine intended for purposes other than slaughter may be moved interstate from the area herein quarantined only upon permission of the Secretary of Agriculture first had and obtained, and under such restrictions as he may impose in each case.

10. Hides, skins and hoofs removed after January 1, 1909, from the carcasses of cattle, calves, sheep or goats, slaughtered within the area herein quarantined, may be moved interstate, within disinfection or certification, subject to permission of the State authorities at destination, provided that the said hides, skins or hoofs have not been in contact with hides, skins or hoofs from the carcasses of animals slaughtered before January 1, 1909, within the area herein quarantined.

11. Hides, skins and hoofs of cattle, calves, sheep and goats, which originated outside of the area herein quarantined, and which have been removed from carcasses prior to January 1, 1909, at establishments having inspection under the Federal Meat Inspection law, may be moved interstate from the area herein quarantined without disinfection, subject to the permission of the State authorities at destination, provided that such hides, skins, or hoofs have not been in contact with other hides, skins or hoofs removed prior to January 1, 1909, and which are in the area herein quarantined.

12. Hides, skins and hoofs of cattle, sheep and goats which are within the area herein quarantined, but which are not heretofore provided for in this Order, shall be disinfected under the supervision of, and be certified by an employee of the Bureau of Animal Industry before being moved interstate from the area herein quarantined.

13. Hay, straw and similar fodder may be moved interstate from the area herein quarantined only upon certification by an employee of the Bureau of Animal Industry.

14. Rule 6, Revision 1, dated November 29, 1908, effective on and after November 19, 1908, and all amendments thereto, being amendments 1, 2, 3, 4, 5, 6, 7, 8, 9, 10 and 11, shall cease to be effective on and after February 25, 1909, on and after which date this Rule 6, Revision 2, which, for purposes of identification is designated as B. A. I. Order 157, and which is subject to amendment or revision on statutory notice, shall become and be effective until otherwise ordered.

C. WHEREAS, the said quarantine order of the Secretary of the United States Department of Agriculture has been issued under the condition that the Pennsylvania State Livestock Sanitary Board will establish and maintain a quarantine prohibiting the movement of cattle, sheep, other ruminants and swine, or of hay, straw or similar fodder, hides, skins, or hoofs of cattle, sheep, other ruminants and swine, from or out of any of the counties, townships, cities or boroughs aforesaid to any other part of the State except in conformity with the terms of the said order of quarantine:

D. THEREFORE, IT IS HEREBY ORDERED: To prevent the spread of foot-and-mouth disease and to aid in its eradication, quarantined districts are established to include the territory described below, which areas are hereby declared to be quarantined districts:

- In **BERKS** County, the township of Hereford;
- In **BUCKS** County, the townships of Milford, Richland and Springfield, and the boroughs included therein;
- In **CENTRE** County, the townships of Marion and Walker.
- In **CLINTON** County, the townships of Porter, Lamar, Wayne, Dunstable, Woodward, Castanea, Bald Eagle, Allison and Pine Creek, the boroughs of Mill Hall and Flemington, and the City of Lock Haven;
- In **COLUMBIA** County, the townships of Hemlock and Montour;
- In **CHESTER** County, the townships of East Town, Tredyffrin, East Whiteland, Willistown, East Goshen, West Town, Thornbury, and Birmingham and the boroughs included therein;
- In **DAUPHIN** County, the townships of Upper Paxton and Halifax, and the the boroughs included therein;
- In **DELAWARE** County, the townships of Haverford, Radnor, Newtown, Marple, Upper Providence, Edgemont, Middletown, Aston, Concord, Thornbury and Birmingham and the borough of Media;
- In **JUNIATA** County, that portion of the county lying north and east of the Juniata River;
- In **LANCASTER** County, the townships of East Donegal, Rapho, Penn. Warwick, West Earl, Upper Leacock, Leacock, East Lampeter, Manheim, East Hempfield, West Hempfield, Manor, Lancaster, Pequea, West Lampeter, Starsburg, Providence, Conestoga, Martick and Drumore, and the boroughs and the City of Lancaster included therein.
- In **LEHIGH** County, the entire county, excepting Hanover township and the boroughs of Catasauqua and West Bethlehem;
- In **LYCOMING** County, the City of Williamsport;
- In **MONTGOMERY** County, the townships of Upper Hanover, Skippack, Towamensing, Upper Gwynedd, Lower Gwynedd, Upper Dublin, Springfield, White Marsh, Whitepain, Worcester, Lower Providence, Norriton, Plymouth, Upper Merion and Lower Merion and all boroughs and cities included therein: and also the borough of Lansdale;
- In **MONTOUR** County, the townships of Anthony, Limestone, Valley, West Hemlock, Cooper, Mahoning, Mayberry and the borough of Danville;
- In **NORTHAMPTON** County, the township of Lower Saucon, and the boroughs of South Bethlehem and Hellertown;
- In **NORTHUMBERLAND** County, the townships of Delaware, Lewis, Turbot, West Chillisquaque, East Chillisquaque, Point, Upper Augusta, Gearhart, Rush, Ralpho, Shamokin and Rockefeller, and the boroughs included therein;
- The County and City of **PHILADELPHIA**;
- In **SNYDER** County, all of the county excepting the townships of Monroe, Spring and West Beaver;
- In **UNION** County, all of the county excepting the townships of Lewis and Hartley;
- In **YORK** County, the townships of Codorus and Manheim, and the boroughs included therein.

E. 1. It is prohibited, during the existence of this quarantine, except as hereinafter otherwise provided, to move, drive or transport cattle, sheep, other ruminants and swine, or to ship or remove hay, straw, similar fodder, hides, skins or hoofs from the said quarantined districts.

2. It is forbidden to drive, transport or move cattle, sheep, other ruminants or swine over or upon public roads or highways within the quarantined districts except upon specific permission in writing from an agent of the State Livestock Sanitary Board expressly authorized to issue such permits.

3. Permits for driving, transporting or moving cattle, sheep, other ruminants or swine over the public roads or highways must be taken out in advance and must be held by the person in charge of and accompanying such animals and must be kept available for inspection.

4. After inspection by an agent of the State Livestock Sanitary Board expressly authorized to issue permits, cattle, sheep, other ruminants and swine in the quarantined districts may, upon such permit being granted, be moved to points outside of the quarantined districts of Pennsylvania for immediate slaughter. Such livestock shall be handled in pens that are not used for animals shipped interstate and, so far as possible, in pens set aside for the use of animals from quarantined districts.

5. Cattle, sheep, other ruminants and swine intended for purposes other than slaughter may be moved from the districts herein quarantined only upon specific permission from the State Veterinarian, and other such restrictions as he may impose in each case.

6. The carcasses of cattle, calves, sheep or goats slaughtered within the quarantined districts, and hides, skins and hoofs removed after January 1, 1909, may be moved to points outside of the quarantined districts without disinfection or certification, provided the said hides, skins or hoofs have not been in contact with hides, skins or hoofs nor with the carcasses of animals slaughtered before January 1, 1909, within the above described quarantined districts.

7. Hides, skins and hoofs of cattle, calves, sheep and goats removed before January 1, 1909, within the described quarantined district shall not be moved to any other part of the State until satisfactorily disinfected and only upon permits from an authorized agent of the State Livestock Sanitary Board; provided, that permits may be issued for transportation to other parts of the State, of undisinfected hides, skins and hoofs from carcasses of animals from outside of the district here quarantined, and that have been removed before January 1, 1909, at an establishment within a quarantined district having inspection under the federal Meat Inspection law if the said hides, skins and hoofs have been stored apart from commodities that it is necessary to disinfect upon certification of the above facts by a federal veterinary inspector.

8. Hay, straw and similar fodder may be removed from the above described quarantined districts to other points in the State upon permit issued by an agent of the State Livestock Sanitary Board.

Commonwealth of Pennsylvania

DEPARTMENT OF AGRICULTURE

Bulletin No. 212



**TABULATED ANALYSES OF
COMMERCIAL FERTILIZERS**

**From Samples Selected in Accordance
with Act of May 1, 1909**

**BY THE PENNSYLVANIA DEPARTMENT
OF AGRICULTURE**

From January 1 to August 1, 1911

HARRISBURG:

**C. E. AUGHINBAUGH, PRINTER TO THE STATE OF PENNSYLVANIA
1911**

OATH OF FERTILIZER SAMPLING AGENT.

Commonwealth of Pennsylvania, ss:

Personally appeared before me, ...
of County of and State
of Pennsylvania, who being duly sworn according to law, doth de-
pose and say: That he has been duly appointed an agent of the De-
partment of Agriculture of Pennsylvania to collect samples of Com-
mercial Fertilizers for analysis, that he is not in any way interested
in the manufacture or sale of any fertilizer, and that he will per-
form the duties of the office with fidelity in accordance with the
requirements of law to the best of his ability, and as set forth in the
instructions issued by the Secretary of the Department of Agricul-
ture, governing the sampling of fertilizers in this State.

Sworn and subscribed before me, this }
..... day of }
A. D. } (Signed), ...
..... }
..... }

Commonwealth of Pennsylvania

DEPARTMENT OF AGRICULTURE

Bulletin No. 212



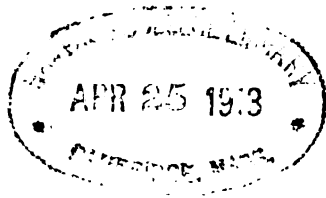
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University of Illinois Library



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The Act of 1st May, 1909, Commonly Referred to as "The New Fertilizer Law" is as Follows:

No. 205.

AN ACT

To regulate the manufacture and sale of commercial fertilizers; prescribing penalties for its violation, and repealing an act, entitled "An act to regulate the manufacture and sale of commercial fertilizers; providing for its enforcement, and prescribing penalties for its violation," approved the twenty-fifth day of March, Anno Domini one thousand nine hundred and one.

Section 1. Be it enacted, &c., That every package of commercial fertilizer sold, offered, or exposed for sale, for manurial purposes within this Commonwealth, except the dung of domestic animals, lime, marl, and wood-ashes, shall have plainly stamped thereon the name and address of the manufacturer or importer and his place of business, the net weight of the contents of the package, the brand or trade-name of the fertilizer the package contains, and an analysis stating the percentage such fertilizer contains of nitrogen in an available form, of potash soluble in water, of soluble and reverted phosphoric acid, and of insoluble phosphoric acid.

Section 2. Every manufacturer or importer of commercial fertilizers, as specified in section one of this act, shall, on or before the first day of January of each year, or before offering them for sale in this Commonwealth, file annually with the Secretary of Agriculture a statement of the names and number of brands of such commercial fertilizers, having distinct trade-names, that he shall offer for sale during the next ensuing year, and a copy of the analysis of each one of such brands of commercial fertilizers, as required by section one of this act.

Section 3. In addition to the statement required by section two of this act, every manufacturer or importer of commercial fertilizers shall, on or before the first day of January of each year, or before offering them for sale in this Commonwealth, file annually with the Secretary of Agriculture an affidavit showing the amount of each brand of fertilizer, having a distinct trade-name, sold within the Commonwealth during the last preceding year; and if the said amount shall be one hundred tons or less, he or they shall pay or cause to be paid to the Secretary of Agriculture the sum of fifteen dollars for each and every brand of such commercial fertilizer, having a distinct trade name sold within the State during the last preceding year:

and if the said amount shall exceed one hundred tons, and be less than five hundred tons, he or they shall pay the sum of twenty dollars, as aforesaid; and if the said amount shall be five hundred tons or more, he or they shall pay the sum of thirty dollars, as aforesaid. If such manufacturer or manufacturers, importer or importers, shall not have made any sales within the Commonwealth during the preceding year, he or they shall pay the sum of fifteen dollars upon each such brand, as aforesaid: Provided, That all monies so received shall be immediately paid by the Secretary of Agriculture into the State Treasury, for the use of the Commonwealth.

Section 4. No person shall sell, offer, or expose for sale, in this State, any pulverized leather, hair, ground hoofs, horns, or wool waste, raw, steamed, roasted, or in any form, as a fertilizer, or as an ingredient of a fertilizer or manure, without an explicit statement of the fact; said statement to be conspicuously affixed to every package of such fertilizer or manure, and to accompany and go with every lot, parcel, or package of the same.

Section 5. Any person or persons selling, offering, or exposing for sale, any commercial fertilizer or any brand of the same, having a distinct trade-name, without the analysis required by section one of this act, or with an analysis stating that it contains a larger percentage of any one or more of the above-named constituents than is contained therein, or for the sale of which all the provisions of sections two and three have not been complied with, or any person violating any of the provisions of section four of this act, shall be guilty of a misdemeanor, and, on conviction, shall be sentenced to pay a fine of not less than twenty-five nor more than one hundred dollars for the first offense, and not less than two hundred dollars for each subsequent offense. It shall be the duty of the Secretary of Agriculture to enforce the provisions of this act, and all penalties, costs, and fines recovered shall be paid to him or his duly authorized agent, and by him shall be immediately paid into the State Treasury, for the use of the Commonwealth.

Section 6. The Secretary of Agriculture is hereby empowered to collect samples of commercial fertilizers, either in person or by his duly qualified agent or representative, and to have them analyzed, and to publish the results for the information of the public; and for this purpose the said Secretary of Agriculture, such assistants, agents, experts, chemists, detectives, and counsel as he shall duly authorize, shall have full access, ingress, and egress to and from all places of business, factories, barns, buildings, carriages, cars, and vessels, used in the manufacture and transporta-

tion, or sale, or any commercial fertilizer. They shall also have power to open any package or vessel containing or supposed to contain any commercial fertilizer, and take therefrom samples for analysis, upon tendering the value of said samples.

Section 7. The term "commercial fertilizers," as used in this act, shall be construed to mean any and every substance imported, manufactured, prepared, or sold for fertilizing or manuring purposes, except the dung of domestic animals, marl, lime, and wood-ashes, and not exempt by the provisions of section one of this act.

Section 8. This act shall go into effect on and after the thirty-first day of July, one thousand nine hundred and nine; and the act, entitled "An act to regulate the manufacture and sale of commercial fertilizers; providing for its enforcement, and prescribing penalties for its violation," approved the twenty-fifth day of March, Anno Domini one thousand nine hundred and one, is hereby repealed.

Approved—The 1st day of May, A. D. 1909.

EDWIN S. STUART.

No. 95.

AN ACT

Making it unlawful for any person, firm, or corporation, engaged in the manufacture or sale of commercial fertilizers, to use the word "bone" in connection with, or as part of the name of, any fertilizer, or any brand of the same, unless the phosphoric acid contained in such fertilizer shall be the product of pure animal bone; and providing a penalty for violation of the same.

Section 1. Be it enacted, &c., That it shall be unlawful for any person, firm or corporation, engaged in the manufacture or sale of commercial fertilizers, to use the word "bone" in connection with, or as part of the name of, any fertilizer, or any brand of the same, unless the phosphoric acid contained in such fertilizer shall be the product of pure animal bone.

Section 2. Any person or persons violating the provisions of this act shall be deemed guilty of a misdemeanor, and, upon conviction thereof, shall pay a fine of fifty dollars for the first offense, and a fine of not less than one hundred dollars, nor more than two hundred dollars, for every subsequent offense; such fine or fines to be paid into the State Treasury, for the use of the Commonwealth. The Secretary of Agriculture shall, together with his deputies, agents, and assistants, be charged with the enforcement of this act.

Section 3. All magistrates, aldermen, and justices of the peace throughout this Commonwealth shall have jurisdiction to hear and determine actions arising from violations of the provisions of this act, and shall have authority to hold for court, or to impose the penalty hereby prescribed, subject to appeal, as the law shall direct.

Section 4. This act shall go into effect on the first day of January, Anno Domini nineteen hundred and ten.

Approved—The 23d day of April, A. D. 1909.

EDWIN S. STUART.

State College, Pa., July 22, 1911.

Hon. N. B. Critchfield, *Secretary of Agriculture, Harrisburg, Pa.:*

Dear Sir: I have the honor to transmit herewith my report upon the analyses of the samples of commercial fertilizers received from official sampling agents during the spring season of 1911.

Very respectfully,

WM. FREAR,

*Vice Director and Chemist, The Penna. State College Agricultural
Experimental Station.*

FERTILIZER VALUATIONS.

The object of an official valuation of commercial fertilizers is to enable the consumer to judge approximately whether he has been asked to pay for a given brand more than the fertilizing ingredients it contains and market conditions prevailing at the time would warrant. It is clear, therefore, that no attempt is made in this valuation to indicate whether the fertilizer valued possesses a greater or less crop-producing capacity than another fertilizer; but only whether it is higher priced than another of the same general composition.

For this purpose the valuation must be so computed as to include all the elements entering into the cost of a fertilizer as it is delivered to the consumer. These elements may conveniently be grouped as follows:

1. The wholesale cost of the ingredients.
2. The jobbers' gross profit on the sale of the ingredients; this includes office expenses, advertising, losses, etc.; for the purpose of the present computation it may be assumed that the sum of this gross profit and the wholesale cost of the ingredients, is equivalent to the retail price of the single ingredients near the wholesale markets in ton lots of original packages for cash.
3. The expense and profit of mixing: This item applies only to complete fertilizers, rock and potash, and ammoniated rock; not to dissolved or ground bone, or to dissolved rock.
4. The expense and profit of bagging.
5. Agents' commission: This item includes not only the commission proper, but every advance in price due to the sale of the goods through an agent in small quantities on time, rather than directly to the consumer in ton lots for cash.
6. Freight from the wholesale market to the point of delivery.

The valuations for 1911 were based:

1. Upon the wholesale prices from September 1, 1910, to March 1, 1911, of the raw materials used in fertilizer manufacture, the quotations of the New York market being adopted for all materials except acidulated phosphate rock and ground bone.

2. Upon an allowance of 20 per cent. of the wholesale prices, above mentioned, to cover jobbers' gross profit.

By adding the 20 per cent. allowed for jobbers' gross profit to the wholesale price of the several raw materials, the retail price in original packages at the jobbers' warehouse is obtained.

Since the amount of the several valuable fertilizing constituents in the various raw materials is known, it is a simple matter to determine the corresponding retail value per pound of the valuable fertilizing constituents yielded by each raw material. A schedule of these pound values affords a convenient basis of computation of the value per ton of various fertilizers, whose composition is ascertained by analysis.

The values assigned, for the present, to the other elements in the cost of the fertilizer at the point of delivery are:

3. For mixing, \$1.00 per ton.

4. For bagging, \$1.00 per ton, in all cases except those in which the article was sold in original packages; the cost of the package being, in such cases, included in the wholesale price.

5. For agents' commission, 20 per cent. of the cost of the goods f. o. b. at the jobbers' or mixers' warehouse.

6. For freight, \$2.00 per ton; the cost of the freight in lots of twelve tons or over, from the seaboard to Harrisburg, averaging \$1.88 per ton.

The following valuation of dissolved South Carolina rock illustrates the method:

Phosphoric Acid.	%	Weight per ton.	
Available, ...	14.00	280 lbs. at 3c.	\$8.40
Insoluble, ...	1.00	20 lbs. at 1½c.	.30
Retail cash value of ingredients, ...			8.70
Bagging, ...			1.00
Cash value of goods ready for shipment, ...			9.70
Agents' commission, 20 per cent., ...			1.94
Freight, ...			2.00
Commercial value per ton, ...			\$13.64

It is not to be expected, of course, that the valuations thus computed will precisely represent the fair price to be charged for a brand in each locality and in every transaction. Market conditions, competition, distance from factory, all introduce minor variations. Nevertheless, to make the approximation reasonably close the average valuation of a given class of goods ought to agree closely with its ascertained average selling price. Whenever such an agreement is no longer obtained by the use of a schedule, it is evident that the schedule of retail values of the constituents, or the added allowances for mixing, etc., requires revision.

It is needful to note here another factor greatly affecting the practical accuracy of these approximations. Their computation would offer little difficulty and their usefulness be far greater, if, by the

ordinary methods of analysis, the exact nature of the ingredients used to supply the several fertilizer constituents, were capable of certain determination. This is, however, possible to-day to only a limited extent. The valuations are therefore based on the assumption that the fertilizers are uniformly compounded from high quality ingredients, such as are commonly employed in the manufacture of fertilizers of the several classes. Consumers should carefully avoid the error of accepting such valuations as infallible; they are not designed to be used for close comparisons of single brands, but only to indicate whether the price asked for a fertilizer is abnormal, assuming good quality for the ingredients used. From this it is clear that, *except as high freights may require, the selling price of a brand should not far exceed the valuation; but that a fertilizer may be made of inferior materials and yet have a high valuation.*

The valuations used during 1910 were modified for use during 1911 in accordance with the changes in wholesale prices of fertilizing ingredients and to make the valuations more closely follow the selling price.

The following comparative statement shows the valuations and selling prices of the several classes of fertilizers during 1906 to 1910.

Fertilizers.	Number of samples.	Valuation.	Selling price.	Difference of valuation from selling price.
Spring, 1906.				
Complete, ...	412	24.76	23.55	1.31
Rock-and-potash, ...	99	15.19	16.17	-.98
Dissolved bone, ...	4	22.65	24.40	-1.75
Ground bone, ...	34	23.23	29.02	-5.79
Dissolved rock, ...	45	12.98	13.75	-.77
Fall, 1906.				
Complete, ...	266	22.99	21.87	1.12
Rock-and-potash, ...	71	15.06	15.76	-.70
Dissolved bone, ...	7	25.33	22.06	3.27
Ground bone, ...	34	29.12	27.80	1.32
Dissolved rock, ...	43	12.99	13.45	-.46
Spring, 1907.				
Complete, ...	424	26.84	24.60	2.24
Rock-and-potash, ...	103	16.63	16.94	-.31
Dissolved bone, ...	6	25.08	22.28	2.80
Ground bone, ...	27	29.64	31.55	-1.91
Dissolved rock, ...	41	14.72	14.64	.08
Fall, 1907.				
Complete, ...	280	24.59	22.71	1.88
Rock-and-potash, ...	96	15.82	16.58	-.76
Dissolved bone, ...	8	27.61	22.09	5.52
Ground bone, ...	36	28.80	28.92	-.12
Dissolved rock, ...	48	14.67	14.76	-.09

Fertilizers.	Number of samples.	Valuation.	Selling price.	Difference of valuation from selling price.
Spring, 1908.				
Complete, -----	455	25.23	25.00	.54
Rock-and-potash, -----	108	16.24	16.96	-.68
Dissolved bone, -----	4	23.00	21.11	1.88
Ground bone, -----	21	28.96	29.04	-.08
Dissolved rock, -----	33	14.92	14.72	.20
Fall, 1908.				
Complete, -----	287	23.88	22.34	1.54
Rock-and-potash, -----	104	16.17	16.43	-.26
Dissolved bone, -----	6	26.06	22.48	3.57
Ground bone, -----	30	27.90	29.18	-1.28
Dissolved rock, -----	49	14.86	14.31	.55
Spring, 1909.				
Complete, -----	426	25.31	24.86	-.43
Rock-and-potash, -----	111	15.94	16.98	-1.40
Dissolved bone, -----	8	21.57	22.25	-.68
Ground bone, -----	24	30.28	30.70	-.42
Dissolved rock, -----	33	13.62	14.76	-1.14
Fall, 1909.				
Complete, -----	255	22.25	22.07	.14
Rock-and-potash, -----	92	15.50	16.10	-.60
Dissolved bone, -----	3	22.85	24.50	-1.65
Ground bone, -----	26	28.71	29.39	-.68
Dissolved rock, -----	41	14.02	13.86	.16
Spring, 1910.				
Complete, -----	430	26.63	25.26	1.37
Rock-and-potash, -----	123	16.08	17.16	-1.08
Dissolved bone, -----	8	21.47	22.17	-.70
Ground bone, -----	24	30.27	30.19	.08
Dissolved rock, -----	47	14.00	14.56	-.56
Fall, 1910.				
Complete, -----	294	22.24	21.76	.48
Rock-and-potash, -----	109	16.34	16.38	-.04
Dissolved bone, -----	4	25.70	25.80	-.10
Ground bone, -----	29	31.10	29.98	1.12
Dissolved rock, -----	32	14.15	14.01	.14

The following statement from the weekly reports of the Oil, Paint and Drug Reporter, of New York City, shows the average wholesale prices of fertilizer raw materials from September 1, 1909, to March 1, 1910, and from September 1, 1910, to March 1, 1911:

Wholesale Prices of Fertilizer Ingredients, New York, Oil, Paint and Drug Reporter.

Substance.	Amount priced.	Average price Sept. 1, 1909 to March 1, 1910.	Average price Sept. 1, 1910 to March 1, 1911.	Prices Sept.-March 1910-11, in per cent. of prices 1908-1910.
Sulphate of ammonia, -----	Cwt., -----	2.6547	2.945	110.9
Nitrate of soda, -----	Cwt., -----	2.0941	2.1236	101.1
Dried blood, H. G., -----	Unit (20 lbs.), -----	2.8531	3.396	115.3
Concentrated tankage, -----	Unit (20 lbs.), -----	2.4783	2.78	112.0
Rough bone, -----	Ton, -----	20.92	21.50	102.8
Bone meal, -----	Ton, -----	21.7812	23.25	106.3
Fish guano, dry, -----	Unit (20 lbs.), -----	2.9191	3.073	105.2
Phosphate rock, Tennessee, -----	Ton, -----	5.25	5.25	100.0
Acid phosphate, -----	Unit (20 lbs.), -----	.575	.635	110.4
Double manure salt, -----	Ton, -----	23.10	22.75	98.4
Sulphate of potash, -----	Ton, -----	43.39	43.50	100.3
Kalnit, -----	Ton, -----	8.47	7.50	88.5
Muriate of potash, -----	Ton, -----	37.66	35.75	94.9
Sulphuric acid, 66° B., -----	Cwt., -----	1.06	1.06	100.0

In ammoniates such as dried blood and fish guano, the unit is of ammonia, of which 82.35 per cent. is nitrogen; in acid phosphate, the unit is of phosphoric acid (phosphorus pentoxid).

There has been a slight increase in prices in blood, bone and tankage, due to the increased demand for this class of ammoniates caused by the export business, which has taken practically all of the cotton-seed meal out of the country.

Nitrate of soda and sulphate of ammonia, also, showed a slight increase in price.

Acid phosphate is slightly higher, while phosphate rock shows no change in price compared with last year, the price per short ton having remained constant throughout the year at \$5.25, for Tennessee phosphate.

Potash Salts: The reports of the U. S. Bureau of Statistics show the following entries for consumption during the fiscal year 1908 and 1909:

	1908.	1909.
Muriate (pounds), -----	286,949,002	297,537,888
Kieserit, kalnit, etc. (tons), -----	329,487	

The past year has witnessed a struggle on the part of certain commercial interests to divide the Prussian potash monopoly. Its immediate effect has not, however, altered materially, if at all, the existing schedule of potash prices.

Composition of Raw Materials.—In order to form a correct idea of the cost per pound of the fertilizer constituents of these materials, it is needful to determine their composition or, in other words, the quantities of valuable constituents each contains. The following table shows the composition of the raw materials used in the manufacture of fertilizers. Few analyses of these materials, with the exception of ground bone and dissolved rock, have been made in Pennsylvania. The figures in the following table include the averages of the results of analyses made in Connecticut, New Jersey and Massachusetts during the past year, except in the case of ground bone and dissolved rock phosphates, where Pennsylvania results alone are included.

Composition of Non-Acidulated Fertilizer Ingredients (Per cent.)

Substance.	Number of samples analyzed.	Nitrogen.	Potash.	Total phosphoric acid.
Sulphate of ammonia, -----	15	20.10	-----	-----
Nitrate of soda, -----	74	15.43	-----	-----
Dried blood, -----	24	10.68	-----	-----
Ground bone, -----	85	2.86	-----	24.41
Tankage, -----	63	5.86	-----	11.51
Ground fish, -----	82	7.91	-----	7.42
Cottonseed meal, -----	200	6.94	-----	-----
Castor pomace, -----	10	5.06	-----	-----
Sulphate of potash, -----	21	-----	50.25	-----
Muriate of potash, -----	63	-----	51.56	-----
Kainit, -----	30	-----	13.24	-----
Double sulphate of potash and magnesia, -----	7	-----	27.26	-----

Composition of Acidulated Fertilizer Ingredients (Per cent.)

	Number of samples.	Total phosphoric acid.	Insoluble phosphoric acid.	Nitrogen.
Dissolved bone, -----	4	14.02	2.95	2.01
Dissolved rock phosphate, -----	22	15.56	1.29	-----

Cost per Pound of Fertilizer Constituents.—With the composition of these raw materials and their price per ton, hundred weight, or other unit of measure as a basis, the wholesale cost per pound of the valuable constituents can readily be calculated. In many cases the ammoniates are quoted “per unit of ammonia,” the term unit being equivalent to per cent.; in goods sold by the ton of 2,000 lbs., the unit is equal to 20 lbs., and 20 lbs. of ammonia contain 16.47 lbs. of nitrogen.

In the case of refuse bone-black, unacidulated, the mean, 28.25 per cent. of phosphoric acid, is assumed to represent the average material on the market.

Phosphate rock is sold by the ton of 2,240 lbs., and on the basis of the bone phosphate of lime it contains, with drawbacks for injurious constituents. Bone-phosphate of lime contains 45.8 per cent. of phosphoric acid; therefore, each per cent. of bone phosphate in a long ton is equivalent to 22.4 lbs., and contains 10.26 lbs. of phosphoric acid.

In the wholesale trade, dried blood, azotine, concentrated tankage and hoof meals are usually sold on the basis of ammonia, disregarding the phosphoric acid present.

Insoluble phosphoric acid in dissolved rock is likewise omitted from consideration, contracts being based solely upon the “available” phosphoric acid; nor in rock phosphates is any claim made for the small quantities of nitrogen and potash they contain, nor in dissolved bone for the potash present.

Under these conditions, the wholesale cost per pound in New York of the valuable constituents of such materials as furnish but a single fertilizing element, these materials being assumed to be in the state of preparation and in the packing in which the manufacturer purchased them, are given in the following table; also a figure representing a fair retail price at the factory, the materials having undergone no change in treatment or packing and the allowance for expenses and profit in retailing being 20 per cent.

Wholesale Cost per Pound of Fertilizing Constituents, New York.

1. INGREDIENTS SUPPLYING ONE CONSTITUENT.

Materials.	Constituent Valued.	Wholesale price, cents.	Wholesale prices plus 20 per cent., cents.
Sulphate of ammonia, -----	Nitrogen, -----	14.06	17.69
Nitrate of soda, -----	Nitrogen, -----	13.44	16.40
Dried blood, -----	Nitrogen, -----	20.00	24.00
Concentrated tankage, -----	Nitrogen, -----	10.88	20.26
Phosphate rock, Tennessee, 78 per cent.,*	Phosphoric acid, total, -----	.73	.98
Acid phosphate, -----	Phosphoric acid, available, -----	2.175	3.81
Double sulphate of potash and magnesia,	Potash, -----	4.17	5.00
Sulphate of potash, -----	Potash, -----	4.33	5.10
Kainit, -----	Potash, -----	2.83	3.49
Muriate of potash, -----	Potash, -----	3.49	4.19

*The prices of phosphate rock are f. o. b. at the respective points of shipment, not New York. The prices for potash are taken from the schedule of the syndicate, and those of the remainder from the Oil, Paint and Drug Reporter.

The quotations for bone are given without specific reference to quality, so that it is impossible, from these data, fairly to apportion their several wholesale values to the nitrogen and phosphoric acid contained in this material. As compared with tankage, the general tendency is to assign a higher commercial rating to the phosphoric acid in bone, and to nitrogen, a rating not very different from that given in tankage.

In former years, the value assigned to the nitrogen has been the same as that quoted on crushed tankage, c. a. f. Baltimore. In later years, quotations for both crushed tankage and ground tankage have not been available, and for that reason, the value of nitrogen is based upon the quotations for concentrated tankage.

In earlier years, quotations on ground tankage have been about 5 per cent. in advance of those on concentrated tankage, also quotations on crushed tankage were on an average 12.67 per cent. in advance of these on ground tankage. Increasing the price of concentrated tankage by these percentages we have \$3.28 per unit of ammonia as the value assigned to the nitrogen in bone.

This is equivalent to \$3.99 per unit of nitrogen.

The average composition of the ground bone and bone meal samples analyzed last fall in Pennsylvania was: Phosphoric acid, 22.23 per cent.; nitrogen 2.87 per cent.

The prepared bone contains less fat and moisture, and often less nitrogen than the ordinary rough bone, but these differences tend, in a measure, to neutralize each other. Assuming for the rough bone

quoted in the New York market the same composition as the bone meal sold in Pennsylvania, and for the value of the nitrogen \$3.99 per unit, as previously stated, the values per pound of the several constituents would be:

Wholesale Cost per Pound of Fertilizer Constituents, New York.

II. BONE.

Materials.	Constituent Valued.	Wholesale price, cents.	Wholesale price plus 20 per cent.
Rough bone, -----	(Nitrogen, -----)	19.95	23.94
	(Phosphoric acid, -----)	2.49	2.99
Ground bone, -----	(Nitrogen, -----)	21.55	25.86
	(Phosphoric acid, -----)	2.69	3.23

Valuation in Neighboring States.

It is desirable, from all points of view, that the schedules of valuation throughout a district in which similar market conditions prevail, should differ as little as possible. It has been our practice in the past, to conform our schedule to that adopted after very careful co-operative study of market conditions for each year, by the New England States, New York and New Jersey, except where the peculiar conditions of our markets have made the valuations diverge too largely from the actual selling prices, as in the case of ground bone and dissolved rock phosphates. The schedules for these States for 1910 and 1911 are as follows:

Trade Values Adopted by the New England States and New Jersey.

	Cents per pound.		Values in 1911 in per cent. of those in 1910.
	1910.	1911.	
Nitrogen:			
In nitrates, ...	16	16	100.0
In ammonium salts, ...	16	16	100.0
In dry and fine ground fish and blood, ...	20	23	115.0
In fine bone and tankage and mixed fertilizers, ...	20	20	100.0
In coarse bone and tankage, ...	15	15	100.0
Phosphoric acid:			
Water soluble, ...	4½	4½	100.0
Citrate soluble, ...	4	4	100.0
In fine ground bone and tankage, ...	4	4	100.0
In coarse bone and tankage, ...	3½	3½	100.0
In mixed fertilizers, insoluble, ...	2	2	100.0
Potash:			
In forms free from muriate, ...	5	5	100.0
As muriate, ...	4½	4½	100.0

Valuations in Pennsylvania.

For reasons stated on the previous page, the New England schedule has been followed in the case of mixed fertilizers and dissolved bones.

In the case of the dissolved rocks, the wholesale prices of raw materials used in their manufacture and of the available phosphoric acid itself, having shown no material change, the values used in the Pennsylvania schedule for 1910 were continued for use during the present year.

In the case of ground bones, the commercial valuations for the fall of 1910 were somewhat greater, on the average, than the retail market prices; the wholesale prices of bone showed, however, some advance during the fall and winter. The valuations and market prices have been brought into closer agreement by a slight increase of the values assigned to bone nitrogen, the change at this point corresponding in direction to that for organic nitrogen in general.

The entire schedule adopted for use in this State is presented in the following table:

Pennsylvania Schedule of Values for Fertilizer Ingredients, 1911.

	Cents per Pound.
Nitrogen:	
In ammonia salts, -----	16
In nitrates, -----	16
In meat, dried blood and mixed fertilizers, -----	20
In fine ground bone and tankage, -----	18
In coarse bone and tankage, -----	16
Phosphoric acid:	
Available, in bone fertilizers, -----	4½
Available, in rock fertilizers, -----	3
Insoluble in ammonium citrate, in bone fertilizers, -----	2
Insoluble in ammonium citrate, in rock fertilizers, -----	1½
In fine bone, tankage and fish, -----	3½
In coarse bone and tankage, -----	2½
In cottonseed meal, castor pomace and wood ashes, -----	3½
Potash:	
In high grade sulphate or forms free from muriate, -----	5
As muriate, -----	4½

Potash in excess of that equivalent to the chlorin present, will be valued as sulphate, and the remainder as muriate.

In certain cases where specific claim is made by the manufacturer that potash has been added as carbonate, potash in excess of that equivalent to soluble chlorides and soluble sulphates will be valued as carbonate.

Nitrogen in mixed fertilizers will be valued as derived from the best sources of organic nitrogen, unless clear evidence to the contrary is obtained.

Phosphoric acid in mixed fertilizers is valued at bone phosphoric acid prices, unless clearly found to be derived from rock phosphate.

Bone is sifted into two grades of fineness: Fine, less than 1.50 inch in diameter; coarse, over 1.50 inch in diameter.

The result obtained by the use of this schedule does not cover the items of mixing, bagging, freight and agents' commission. To cover these, allowances are made as follows:

For freight, an allowance of \$2.00 per ton on all fertilizers.

For bagging, an allowance of \$1.00 per ton on all fertilizers, except when sold in original packages.

For mixing, an allowance of \$1.00 per ton on complete fertilizers and rock-and-potash goods.

For agents' commission, an allowance of 20 per cent. is added to the cash value of the goods ready for shipment.

FERTILIZER ANALYSES JANUARY 1 TO AUGUST 1, 1911.

Since January 1, 1911, there have been received from authorized sampling agents nineteen hundred and sixty-two fertilizer samples, of which seven hundred and thirty-one were subjected to analysis. Preference is given to those which have not been recently analyzed. In cases where two or more samples representing the same brand were received, equal portions from several samples were united, and the composite sample was subjected to analysis.

The samples analyzed group themselves as follows: 485 complete fertilizers, furnishing phosphoric acid, potash and nitrogen; 6 dissolved bones, furnishing phosphoric acid and nitrogen; 129 rock-and-potash fertilizers, furnishing phosphoric acid and potash; 51 acidulated rock phosphates, furnishing phosphoric acid only; 23 ground bones, furnishing phosphoric acid and nitrogen, and 37 miscellaneous samples, which group includes substances not properly classified under the foregoing heads.

The determinations to which a complete fertilizer is subjected are as follows: (1) Moisture, useful for the comparison of analyses, for indication of dry condition and fitness for drilling, and also of the conditions under which the fertilizer was kept in the warehouse. (2) Phosphoric acid—total and insoluble; that is, that portion not soluble in water nor in warm ammonium citrate solution (a solution supposed to represent the action of plant roots upon the fertilizer), which is assumed to have little immediate food value. By difference, it is easy to compute the so-called “available” phosphoric acid. (3) Potash soluble in water—most of that present in green sand marl and crushed minerals, and even some of that present in vegetable materials such as cotton-seed meal, not being included because insoluble in water even after long boiling. (4) Nitrogen—This element is determined by a method which simply accounts for all present, without distinguishing between the quantities present in the several forms of ammonium salts, nitrates or organic matter. (5) Chlorin—this determination is made to afford a basis for estimating the proportion of the potash that is present as chlorid or muriate, the cheaper source. The computation is made on the assumption that the chlorin present, unless in excess, has been introduced in the form of muriate of potash; but doubtless there are occasional exceptions to this rule. One part

of chlorin combines with 1.326 parts of potash to form the pure muriate; knowing the chlorin, it is, therefore, easy to compute the potash equivalent thereto. (7) In the case of ground bone, the state of sub-division is determined by sifting through accurately made sieves; the cost of preparation and especially the promptness of action of bone in the soil depend very largely on the fineness of its particles, the finer being much more quickly useful to the plant.

The preceding paragraph sets forth the nature of the examinations given to the several classes of fertilizers under the laws in force prior to the present year. The legislation of 1909 has made needful, however, some additional tests. Sec. 4, of the Act of May 1, 1909, prohibits the sale of "pulverized leather, hair, ground hoofs, horns, or wool waste, raw, steamed, roasted, or in any form, as a fertilizer, or as an ingredient of a fertilizer or manure, without an explicit statement of the fact." All nitrogenous fertilizers have, therefore, been submitted to a careful microscopic examination, at the time of preparing the sample for analysis, to detect the presence of the tissues characteristic of the several materials above named. The act of April 23, 1909, makes it unlawful to use the word "bone" in connection with, or as part of the name of any fertilizer, or any brand of the same, unless the phosphoric acid contained in such fertilizer shall be the product of pure animal bone. All fertilizers in whose name the word "bone" appears, were therefore examined by microscopic and chemical methods to determine, so far as possible with present knowledge, the nature of the ingredient or ingredients supplying the phosphoric acid. It is a fact, however, well known to fertilizer manufacturers and which should be equally understood by the consumer, that it is, in certain cases, practically impossible to determine the source of the phosphoric acid by an examination of the finished fertilizer. The microscope shows clearly the structure of raw bone, but does not make it possible to discriminate between thoroughly acidulated bone and acidulated rock. The ratio of nitrogen to phosphoric acid in a raw bone—and only such bone as has not been deprived of any considerable proportion of its nitrogenous material by some manufacturing process can properly be called "pure animal bone"—is about 1:8; in cases where the ratio of nitrogen to phosphoric acid exceeds 8, it is clear that part, at least, of the phosphoric acid has been supplied by something else than pure animal bone; but, inasmuch as nitrogen may have been introduced in some material other than bone and no longer detectible by the microscope, the presence of nitrogen and phosphoric acid in the proportions corresponding to those of bone is not proof positive that they have been supplied by bone. Finally, the differences in the iron and silica content of bone and rock respectively, afford means of distinction useful

in some cases; the usefulness of this distinction is limited, however, by the facts that kitchen bone frequently contains earthy impurities rich in iron and silica, and that earthy fillers can legally be used in fertilizers and are in fact considerably used therein both as "make-weights" and as "conditioners" or materials introduced to improve the drilling qualities of the goods. The fact that the phosphoric acid in bone and rock are identical in character is probably so well known as to require no detailed consideration in this connection.

The law having required the manufacturer to guarantee the amount of certain valuable ingredients present in any brand he may put upon the market, chemical analysis is employed to verify the guaranties stamped upon the fertilizer sacks. It has, therefore, been deemed desirable in this report to enter the guaranty filed by the manufacturer in the office of the Secretary of Agriculture, in such connection with the analytical results that the two may be compared. An unfortunate practice has grown up among manufacturers of so wording the guaranty that it seems to declare the presence in the goods of an amount of valuable constituent ranging from a certain minimum to a much higher maximum; thus, "Potash, 2 to 4 per cent." is a guaranty not infrequently given. In reality, the sole guaranty is for 2 per cent. The guaranteed amounts given for each brand in the following tables, are copied from the guaranties filed by the maker of the goods with the Secretary of Agriculture, the lowest figure given for any constituent being considered to be the amount guaranteed. For compactness and because no essentially important fact is suppressed thereby, the guaranties for soluble and reverted phosphoric acid have not been given separately, but are combined into a single guaranty for available phosphoric acid; in cases where the maker's guaranty does not specifically mention available phosphoric acid, the sum of the lowest figures given by him for soluble and reverted phosphoric acid is used. The law of 1879 allowed the maker to express his guaranty for nitrogen either in terms of that element or in terms of the ammonia equivalent thereto; since ammonia is composed of three parts of hydrogen and fourteen parts of nitrogen, it is a very simple matter to calculate the amount of one, when the amount of the other is given; the amount of nitrogen multiplied by 1.214 will give the corresponding amount of ammonia, and the amount of ammonia multiplied by 0.824 will give the corresponding amount of nitrogen. In these tables, the expression is in terms of nitrogen. The laws of 1901 and 1909 abolished this alternative and required that the quantity shall be given in terms of nitrogen.

Many manufacturers after complying with the terms of the law, insert additional items in their guaranties, often with the result of misleading or confusing the buyer; the latter will do well to give heed to those items only that are given as the law requires and that are presented in these tables:

A summary of the analyses made this season may be presented as follows:

Summary of Analyses Made this Season.

	Complete fertilizers.	Rock and potash.	Dissolved bone.	Dissolved rock.	Ground bone.
Number of analyses, -----	485	129	6	51	23
Moisture, per cent., -----	9.46	7.30	9.05	9.21	5.50
Phosphoric acid:					
Total, per cent., -----	9.86	10.86	13.00	15.93	22.86
Available per cent., -----	8.31	9.86	10.24	14.65	-----
Insoluble, per cent., -----	1.55	1.00	2.76	1.27	-----
Potash, per cent., -----	4.97	3.97	-----	-----	-----
Nitrogen, per cent., -----	1.53	-----	1.68	-----	3.10
Mechanical analyses of bone:					
Fine, -----	-----	-----	-----	-----	50
Coarse, -----	-----	-----	-----	-----	50
Commercial valuation, -----	25.96	15.99	23.82	14.26	31.47
Average selling price, -----	24.97	17.06	20.33	15.83	30.93
Commercial value of samples whose selling price is ascertained, -----	25.80	15.97	23.82	14.25	31.47

Summary of Instances of Deficiency from Guaranty.

	Complete fertilizers.	Rock and potash.	Dissolved bone.	Dissolved rock.	Ground bone.
Deficient in four constituents, -----	1	-----	-----	-----	-----
Deficient in three constituents, -----	12	1	-----	-----	-----
Deficient in two constituents, -----	59	6	-----	2	-----
Deficient in one constituent, -----	147	28	1	1	11
Total number of samples in which deficiencies occur, -----	219	35	1	3	11

The cases of deficiency noted during the past eleven seasons in the composition of goods as compared with their guaranties, expressed in percentage of the total number of goods of each class analyzed, are as follows:

Percentage of Deficiency 1906-1911.

	Spring, 1906.	Fall, 1906.	Spring, 1907.	Fall, 1907.	Spring, 1908.	Fall, 1908.	Spring, 1909.	Fall, 1909.	Spring, 1910.	Fall, 1910.	Spring, 1911.
Complete fertilizers, -----	45.4	39.5	39.4	39.3	40.0	40.0	39.5	46.3	28.9	35.9	45.1
Dissolved bone, -----	50.0	28.5	16.6	25.0	150.0	16.6	25.0	*	37.5	25.0	18.6
Rock and potash, -----	42.4	40.0	43.7	46.0	39.0	38.8	36.2	30.4	26.2	37.0	27.1
Dissolved rock, -----	28.8	25.6	19.5	27.0	21.2	28.5	33.3	19.5	4.3	6.3	5.9
Ground bone, -----	49.0	14.7	18.5	27.8	38.0	40.0	20.8	38.4	29.17	27.6	47.8
All classes except miscella- neous, -----	43.8	35.8	36.1	38.9	38.8	38.3	37.6	39.6	26.5	33.5	38.7

*Only two samples analyzed for which no guarantees are reported.

†Only four samples analyzed.

A comparison of the average composition of all samples of complete fertilizers for which guaranties are recorded with the average of the corresponding guaranties, for several seasons past, including those of this season, follows:

Average Composition and Guaranty Compared.

	Average composition. Per cent.	Average guaranty. Per cent.
Spring, 1906.		
Phosphoric acid:		
Total, -----	9.73	9.21
Available, -----	7.88	7.77
Potash, -----	4.21	3.96
Nitrogen, -----	1.67	1.58
Fall, 1906.		
Phosphoric acid:		
Total, -----	10.45	9.70
Available, -----	8.23	8.16
Potash, -----	3.12	2.95
Nitrogen, -----	1.32	1.31
Spring, 1907.		
Phosphoric acid:		
Total, -----	9.21	8.50
Available, -----	8.13	7.83
Potash, -----	4.55	4.31
Nitrogen, -----	1.52	1.47

Average Composition and Guaranty Compared—Continued.

	Average composition. Per cent.	Average guaranty. Per cent.
Fall, 1907.		
Phosphoric acid:		
Total, ...	10.39	9.42
Available, ...	8.34	5.07
Potash, ...	3.18	2.72
Nitrogen, ...	1.39	1.29
Spring, 1908.		
Phosphoric acid:		
Total, ...	10.07	8.91
Available, ...	8.29	7.61
Potash, ...	5.04	4.51
Nitrogen, ...	1.64	1.59
Fall, 1908.		
Phosphoric acid:		
Total, ...	10.29	9.31
Available, ...	8.29	7.96
Potash, ...	3.24	2.94
Nitrogen, ...	1.24	1.23
Spring, 1909.		
Phosphoric acid:		
Total, ...	9.83	8.98
Available, ...	8.07	7.66
Potash, ...	5.07	4.89
Nitrogen, ...	1.67	1.60
Fall, 1909.		
Phosphoric acid:		
Total, ...	10.13	9.34
Available, ...	8.27	8.08
Nitrogen, ...	1.33	1.26
Potash, ...	3.41	3.12
Spring, 1910.		
Phosphoric acid:		
Total, ...	9.80	8.80
Available, ...	8.26	7.62
Potash, ...	5.20	4.68
Nitrogen, ...	1.63	1.60
Fall, 1910.		
Phosphoric acid:		
Total, ...	9.72	8.80
Available, ...	8.26	7.62
Potash, ...	5.20	4.68
Nitrogen, ...	1.63	1.60
Spring, 1911.		
Phosphoric acid:		
Total, ...	9.86	8.96
Available, ...	8.31	7.86
Potash, ...	4.97	4.65
Nitrogen, ...	1.53	1.54

It is of interest to note how closely the series of valuations based upon the wholesale price of raw materials in the principal markets during the most important buying season and upon certain average allowances for expenses and profits on the part of the mixer and jobber coincides with the retail prices later ascertained. A comparison for several seasons past is given below:

Comparison of Selling Price and Valuation, 1906-1911.

	Selling price.	Valuation.	Excess of valuation over selling price.
Complete fertilizers:			
1906, Spring, -----	23.55	24.76	1.21
Fall, -----	21.87	22.99	1.12
1907, Spring, -----	24.60	26.84	2.24
Fall, -----	22.71	24.69	1.88
1908, Spring, -----	25.09	26.23	1.54
Fall, -----	22.34	23.88	1.54
1909, Spring, -----	24.88	25.31	.43
Fall, -----	22.07	22.25	.14
1910, Spring, -----	25.26	26.63	1.43
Fall, -----	21.76	22.24	.48
1911, Spring, -----	24.97	25.95	.98
Dissolved bone:			
1906, Spring, -----	23.83	22.70	-1.13
Fall, -----	24.78	25.85	1.11
1906, Spring, -----	24.40	22.65	-1.75
Fall, -----	22.06	25.33	3.27
1907, Spring, -----	22.28	25.08	2.80
Fall, -----	22.09	27.01	4.92
1908, Spring, -----	21.11	23.09	1.98
Fall, -----	22.48	26.05	3.57
1909, Spring, -----	22.25	21.57	-.68
Fall, -----	24.50	22.35	-1.65
1910, Spring, -----	22.17	21.47	-.70
Fall, -----	25.80	25.70	-.10
1911, Spring, -----	20.33	23.82	3.49
Rock and potash:			
1906, Spring, -----	16.11	15.49	-.62
Fall, -----	15.97	15.04	-.97
1906, Spring, -----	16.17	15.19	-.98
Fall, -----	15.76	15.06	-.70
1907, Spring, -----	16.94	16.53	-.41
Fall, -----	16.58	15.82	-.76
1908, Spring, -----	16.86	16.24	-.62
Fall, -----	16.43	16.17	-.26
1909, Spring, -----	16.98	15.94	1.04
Fall, -----	16.10	15.50	-.60
1910, Spring, -----	17.16	16.08	-1.08
Fall, -----	16.88	16.34	-.54
1911, Spring, -----	17.05	15.99	-1.06
Dissolved rock:			
1906, Spring, -----	13.64	13.86	.22
Fall, -----	12.21	13.51	1.30
1906, Spring, -----	13.75	12.98	-.77
Fall, -----	13.45	12.99	-.46
1907, Spring, -----	14.04	14.72	.68
Fall, -----	14.16	14.67	.51
1908, Spring, -----	14.72	14.92	.20
Fall, -----	14.31	14.86	.55
1909, Spring, -----	14.76	13.62	-1.14
Fall, -----	13.86	14.02	.16
1910, Spring, -----	14.56	14.00	-.56
Fall, -----	14.01	14.15	.14
1911, Spring, -----	15.88	14.26	-1.62

Comparison of Selling Price and Valuation, 1906-1911—Continued.

	Selling price.	Valuation.	Excess of valuation over selling price.
Ground bone:			
1906, Spring, ...	29.08	26.72	-2.36
1906, Fall, ...	27.70	28.70	1.00
1906, Spring, ...	29.02	28.23	-.79
1906, Fall, ...	27.80	29.12	1.32
1907, Spring, ...	31.55	29.64	-1.91
1907, Fall, ...	28.92	28.80	-.12
1908, Spring, ...	29.04	28.96	-.08
1908, Fall, ...	28.18	27.90	-.28
1909, Spring, ...	30.70	30.28	-.42
1909, Fall, ...	29.39	28.71	-.68
1910, Spring, ...	30.19	30.27	.08
1910, Fall, ...	29.98	31.10	1.12
1911, Spring, ...	30.93	31.47	.54

MATERIALS USED IN FERTILIZERS.

The microscopic examination of the nitrogenous fertilizers for leather, hair, and other materials the use of which without notice is prohibited by the Act of May 1, 1909, revealed in no case such quantity of any of these substances as might not fairly be regarded as an accidental trace. No instance has been reported by the sampling agents in which a declaration of the presence of such material has been made. It is, however, a matter of quite general knowledge that substances of this kind are being largely used in fertilizer mixtures; but, in most cases at least, only after such treatment as results in the destruction of the characteristic tissues and, at the same time, wholly or partly in that of the organic compounds originally present. The Pennsylvania Agricultural Experiment Station is now conducting, under the writer's supervision, an investigation to determine the degree to which the acid treatment usually employed improves the availability of the nitrogen in these substances.

In conformity with the requirements of the Act of April 23, 1909, many firms dropped from the brand names of goods manufactured by them the word "bone" hitherto forming part of said names. Where such change in name appears, it may be taken as evidence that the

phosphoric acid is derived, at least in part, from something else than bone. In several cases where the word "bone" remains in the brand name, the composition of the goods makes it clear that the law has been violated. All such cases have been reported for legal action.

ORGANIZATION OF THE WORK.

In conclusion, I would state that the work of the season has been performed under my direction, as follows:

The nitrogen determinations by W. Thomas, B. S.; those of total phosphoric acid by J. W. White, B. S.; of insoluble phosphoric acid by H. D. Edmiston and L. G. Willis, B. S.; of potash, by E. S. Erb, M. S.; and the preparation of samples, care of records, and the detail of the compilation of this bulletin, by G. C. Given, M. S. To these trained and experienced assistants, my acknowledgments are due for loyal and efficient service.

COMPLETE

Sample number.	Manufacturer and Brand.	From Whom Sample Was Taken.	Phosphoric		
			Available.		
			Moisture in 100 pounds.	Found.	Guaranteed.
	AMERICAN AGRICULTURAL CHEMICAL CO., NEW YORK.				
788	†Complete Manure with 10 per cent. Potash.	Richard Graves, Jerwyn, ...	9.44	7.14	6.00
878		William W. Kramer, Powell, ..			
1234		E. D. Everett Co., Warren, ..			
558	†High Grade Potash Compound, ...	S. S. Creese, New Galllee, ...	10.21	8.54	8.00
1824		D. E. Zener, Tamaqua, ...			
500	†Peerless Corn and Grain Grower, ...	E. H. Carl, Coopersburg, ...	9.40	8.75	8.00
786		Richard Graves, Jerwyn, ...			
789	Potato Phosphate, ...	Richard Graves, Jerwyn, ...	9.59	8.11	8.00
645		John W. Buckman, Newtown, ...			
612	†Special Potash Mixture, ...	J. A. Romberger, Elizabethville, ..	9.97	9.24	9.00
1632		E. E. Weter, Silgo, ..			
857	†Superior Compound, ...	Calvin Strong, Ansonville, ...	11.58	9.00	8.00
1899		James L. Culp, Indalna, ...			
364		R. T. Bergstresser, Hellertown, ..			
79	†10 Per Cent. Potash Mixture for Potatoes.	Geo. E. Detrick, York Springs, ..	8.94	5.79	5.00
593		F. P. Spring, Lairdsville, ...			
10	†Top Dresser for Grass, ...	John H. Reed, Roedersville, ...	9.45	8.34	8.00
1386		Roy Ackley, Sabinsville, ...			
1234	†Wheat and Haymaker, ...	W. J. Warwick, Narrowsburg, N. Y., ..	8.75	10.18	10.00
1310		O. L. Schambacker, East Point, ..			
801	†Bradley's B. D. Sea Fowl Guano, ...	Elh Yost, McEwensville, ...	10.81	8.97	8.00
776		T. W. Atkinson, Clifford, ...			
1637		J. H. Sheffer, Knox, ...			
358		Geo. R. Andrews, Enon Valley, ..			
66	†Bradley's Bean & Potato Phosphate,	J. E. Lynch, Friendsville, ...	10.34	7.60	8.00
687		Punxsutawney Planing Mill Co., Punxsutawney, ..			
355		Geo. R. Andrews, Enon Valley, ..			
207	†Bradley's Dissolved Phosphate and Potash.	Schultz & Pardoe, Franklin, ..	11.19	8.83	8.00
1639		J. H. Sheffer, Knox, ...			
686		Punxsutawney Planing Mill Co., Punxsutawney, ..			
136	†Bradley's Niagara Phosphate, ...	Blish Lansberry, Woodland, ..	9.66	7.65	7.00
719		John P. Jones Hdw. Co., Summerville, ..			
443		W. B. Whinney, Middleburg, ..			
229	†Canton Chemical C. O. O. Special Compound.	W. S. Weaver & Son, Easton, Pa., ..	12.06	8.22	8.00
1483		Marion Warehouse Co., Marion, ..			
591		F. P. Spring, Lairdsville, ...			
298	†Canton Chemical Eagle Phosphate, ...	Thomas Kramer, Schuylkill Haven, ..	10.57	7.65	7.00
648		John B. Buckman, Newtown, ...			
297		Thomas Kramer, Schuylkill Haven, ..			
280	†Canton Chemical Potato Manure, ...	W. S. Weaver & Son, Easton, Pa., ..	10.30	7.00	6.00
1374		Rose & McDowell, Mansfield, ..			
644		John B. Buckman, Newtown, ...			
317	†Canton Chemical Resurgam Guano, ...	J. D. Neff, Larrys Creek, ...	13.31	8.78	8.00
1329		Gallup & Co., Fort Allegany, ..			

†Composite sample.

FERTILIZERS.

Acid in 100 Pounds.			Potash in 100 Pounds.				Nitrogen. in 100 lbs.		Computed commercial value of 2,000 pounds at Department rating.	Selling price of 2,000 pounds at point of selection.	Sample number.
Insoluble.	Total.		Present as muriate.	Present as sulphate.	Total.		Found.	Guaranteed.			
	Found.	Guaranteed.			Found.	Guaranteed.					
1.22	8.36	7.00	10.15	-----	10.15	10.00	3.24	3.29	38.22	† 34.00 36.00 34.00 28.00	788 878 1334 588 1824
1.21	9.75	9.00	1.00	8.32	9.92	10.00	1.45	1.65	32.25	24.00 24.00 28.00 30.00	501 783 781 645 612
1.54	10.29	9.00	5.82	-----	5.82	5.00	1.71	1.65	27.64	26.00 28.00 30.00	1682 857 1899 361
1.73	9.84	9.00	5.09	-----	5.09	5.00	1.90	1.65	27.84	25.75	79
1.02	10.26	10.00	5.61	-----	*5.61	7.00	.90	.82	25.54	26.00 28.00 28.00 30.00	503 10 1396
1.71	10.71	9.00	3.99	-----	3.99	4.00	1.61	1.65	26.16	35.00	1234
.87	6.66	6.00	10.01	-----	10.01	10.00	1.64	1.65	28.85	22.00 25.50 30.00 24.00	1310 801 776 1637 358
1.21	9.55	9.00	5.06	-----	5.06	5.00	*4.42	4.94	40.00	24.00 24.00 23.00	66 687 355
4.54	14.97	11.00	8.78	-----	*8.78	10.00	1.66	1.65	33.97	27.00 26.00 20.00	207 1069 686
1.63	10.30	9.00	1.94	-----	1.94	1.50	1.89	2.06	25.12	20.00 20.00 20.00	136 719 443
1.13	*8.73	9.00	4.68	-----	4.63	4.00	1.04	.82	22.48	27.00 18.00 26.00 23.00	229 1483 591 296
1.24	10.07	9.00	2.21	-----	2.21	2.00	*.97	1.03	20.35	26.00 20.00 20.00	648 297 230
1.30	8.95	8.00	1.58	-----	1.58	1.00	.98	.82	19.26	25.00 20.00 20.00	1874 644 317 1889
1.21	9.43	9.00	5.67	-----	*5.67	6.00	1.95	2.06	23.51	23.00	
1.57	9.22	8.00	1.33	-----	1.33	1.00	.89	.52	18.64		
1.58	8.58	7.00	4.88	-----	4.83	5.00	1.17	1.23	22.77		
1.39	10.14	9.00	4.18	-----	4.18	4.00	.88	.82	22.60		

*Constituent falls below guaranty.

COMPLETE FERTI

Sample number.	Manufacturer and Brand.	From Whom Sample Was Taken.	Molature in 100 pounds.	Phosphoric	
				Available.	
				Found.	Guaranteed.
442	Canton Chemical Baker's Special Wheat, Corn and Grass Mixture.	W. B. Whinney, Middleburg,	11.45	9.57	9.00
299		Thomas Kramer, Schuylkill Haven.			
592		F. P. Spring, Lairdsville, ..			
778	Clark's Cove King Phillip's Alkaline Guano.	G. W. Cooperwaite, Jerwyn, ..	10.75	8.20	8.00
1819	Clark's Cove Potato & Hop Grower.	W. F. Landig, Ringtown, ..	6.68	7.09	6.00
986		D. B. Moses, Sprngboro, ..			
1309	Crocker's Ammoniated Superphosphate.	O. L. Shambacker, East Point.	10.87	9.25	9.00
570	Crocker's Complete Manure, ...	E. E. Trilby, West Middlesex, ..	11.07	8.47	8.00
290		W. H. Riland, Friedensburg, ..			
673		S. P. Marsh, Ten Mile Bottom.			
571	Crocker's General Crop Fertilizer, ..	J. W. Hartwell, New Wilmington.	8.97	7.95	7.00
202		H. B. Mitchell & Co., Emleton.			
892		O. O. Salsburg, Ridgway, ..			
289	Crocker's Potato, Hop and Tobacco Fertilizer.	W. H. Riland, Friedensburg, ..	10.67	9.12	8.00
858	Crocker's Universal Grain Grower, ..	Calvin Strong, Ansonville, ..	10.68	9.13	8.00
216		S. P. Marsch, Ten Mile Bottom.			
1631	Crocker's Wheat & Corn Fertilizer, ..	E. E. Weeter, Sligo, ..	10.87	8.55	8.00
856		Calvin Strong, Ansonville, ..			
981		Edgar Waters, Jamestown, ..			
1416	Detrick's Corn & Oats Fertilizer, ..	D. A. Grove, Lemont, ..	9.81	9.34	9.00
1264		O. M. Honeywell, Dallas, ..			
1563	Detrick's Imperial Compound, ...	B. F. Hortling, Newport, ..	12.12	8.79	8.00
193		B. F. Shannon & Co., Butler			
1439	Detrick's K. K. K. Kangaroo Komplete Kompond.	Geo. B. Murphy, Red Lion, ..	12.68	8.48	8.00
1438		Geo. B. Murphy, Red Lion, ..			
794		H. L. Lindner, Milton, R. D. 1.			
1835		Geo. D. Solt, Andreas, ..			
1100	Detrick's Paragon Ammoniated Phosphate & Potash.	Joseph Joshenour, Bermudian,	11.96	7.50	7.00
42	Detrick's Quick Step Phosphate, ...	James McCouley, Mifflintown, ..	11.51	8.68	8.00
600	Detrick's Standard Potash Fertilizer,	Elm Yost, Turbotville, ..	9.33	6.94	6.00
1588		Levi Birkey, Somerset, ..			
1297		Saul Manley, Granville Summit.			
147	Great Eastern High Grade Cabbage Grower.	J. A. Gummo, Mill Hall, R. D. 1.	9.89	9.77	9.00
1697	Great Eastern General, ...	J. Detrick, Millford, ..	11.50	9.16	8.00
1739		William J. Johnston, Sinking Springs.			
1240	Great Eastern High Grade Vegetable, Vine & Tobacco Fertilizer.	W. Avery, Honesdale, ..	11.62	8.57	8.00
1737		William J. Johnston, Sinking Springs.			
1786	Great Eastern Northern Corn Special, ..	William J. Johnston, Sinking Springs.	12.55	9.38	9.00
988	Lazaretto Ammoniated Phosphate, ...	Gonser Bros., Snyderstown, ..	11.92	8.67	8.00
1444	Lazaretto Special Potato Fertilizer, ...	Grove & Uffelman, Brogueville Station.	12.38	8.34	8.00
483	Maryland O. K. Ammoniated Fertilizer	Samuel Helm, Pittman, ..	11.06	9.11	8.00
398	Maryland Special Compound for Potatoes and Tobacco.	J. H. Edinger, Luthersburg, ..	12.40	8.82	8.00
1306		W. L. & M. B. Miller, Gleason.			

†Composite sample.

LIZERS—Continued.

Acid in 100 Pounds.			Potash in 100 Pounds.				Nitrogen. in 100 lbs.		Computed commercial value of 2,000 pounds at Department rating.	Selling price of 2,000 pounds at point of selection.	Sample number.
Insoluble.	Total.		Present as muriate.	Present as sulphate.	Total.		Found.	Guaranteed.			
					Found.	Guaranteed.					
1.33	10.90	10.00	2.19	-----	2.19	2.00	.89	.82	21.36	{ 20.00 120.00	442 290
2.42	10.62	9.00	2.90	-----	2.90	2.00	1.36	1.03	23.36	{ 20.00 20.50	592 778
1.36	8.45	7.00	5.07	-----	5.07	5.00	1.12	1.23	22.72	24.00	1819
1.06	10.31	10.00	2.62	-----	2.62	2.00	2.41	2.47	28.51	{ 28.00 -----	936 1809
1.17	9.64	9.00	4.32	-----	4.32	4.00	1.04	.82	23.06	{ 23.50 20.75	570 290
1.36	9.31	8.00	1.85	-----	1.85	1.00	.95	.82	19.60	{ 26.00 23.00	673 571
.99	10.11	9.00	3.50	-----	3.50	3.00	2.01	2.06	27.34	{ 25.00 25.00	862 289
1.39	10.52	9.00	2.23	-----	2.23	2.00	.86	.82	20.78	{ 22.00 126.00	858 216
1.75	10.30	9.00	2.18	-----	2.18	1.50	*1.53	2.06	23.65	{ 22.00 125.00 23.00	1631 836 931
1.11	10.45	10.00	3.18	-----	3.18	3.00	.89	.82	22.06	{ 1416 1261 18.50	1416 1261 1563
1.12	9.91	9.00	2.16	-----	2.16	2.00	.84	.82	20.18	{ 121.00 17.00 20.00	193 1439 1438
1.43	9.82	9.00	3.23	-----	3.23	3.00	1.60	1.65	24.72	{ 121.00 26.00	791 1835
1.36	8.86	8.00	1.35	-----	1.35	1.00	.88	.82	18.40	17.50	1166
1.21	9.89	9.00	4.21	-----	4.21	4.00	2.43	2.47	29.90	28.00	42
.85	7.79	7.00	5.24	-----	5.24	5.00	1.28	1.23	23.49	{ 121.50 21.00 28.00	630 1588 1297
1.68	11.45	10.00	7.02	-----	7.02	7.00	.79	.82	26.14	{ 124.00	147
1.10	10.26	9.00	4.13	-----	4.13	4.00	1.00	.82	23.30	{ 25.00 22.00	1697 1739
1.73	10.30	9.00	4.63	-----	4.63	3.00	2.07	2.06	28.54	{ 130.60 25.00 26.00	1240 1787 1736
1.47	10.85	10.00	2.63	-----	2.63	2.00	2.02	2.47	26.98	20.56	968
1.15	9.82	9.00	2.19	-----	2.19	2.00	.96	.82	20.56	21.91	1444
1.17	9.51	9.00	4.49	-----	4.49	4.00	.81	.82	21.91	18.75	
1.17	10.28	9.00	2.59	-----	2.59	2.00	.90	.82	21.26	-----	483
1.23	10.10	9.00	10.16	-----	10.16	10.00	1.69	1.65	32.53	{ 181.00 30.00	398 1806

*Constituent falls below guaranty.

COMPLETE FERTI

Sample number.	Manufacturer and Brand.	From Whom Sample Was Taken.	Moisture in 100 pounds.	Phosphoric	
				Available.	
				Found.	Guaranteed.
419	Michigan Carbon Works General Potato Fertilizer.	E. M. Tingley, Harford, -----	11.92	9.06	8.00
574 708	Milison's Buffalo Fertilizer, -----	John T. Crill, Mercer, McCanley, McKay & Co., Brockwayville.	11.64	8.51	8.00
400	Milison's Buffalo Guano, -----	J. H. Edinger, Luthersburg, Isleman Carriage Co., Clar- ion.	12.56	8.94	8.00
1780 882 708	Milison's Corn Fertilizer, ----- Milison's Erie Ring Fertilizer, -----	Willard Arnold, Granville, McCawley, McKay & Co., Brockwayville.	12.71 8.46	9.50 8.09	9.00 7.00
223 1330	Milison's Vegetable Fertilizer, -----	W. H. Mitman, Easton, R. D. 4., E. D. Everett Co., Warren, John T. Crill, Mercer, J. W. Eberts & Co., Clear- field, -----	11.70	8.55	8.00
572	Milison's Wheat, Oats & Barley Fer- tilizer.	McCawley, McKay & Co., Brockwayville.	9.62	8.66	8.00
132	Moro-Phillips' Farmers Potato Mixture	J. Irvin Goss, Painter, Diehl, Omwake & Diehl, Chambersburg.	10.59	6.56	6.00
707 1018 1482	Moro-Phillips' 10 per cent. Potato & vegetable Manure.	H. F. Rittenhouse, Willow Grove. Cornelius Bachman, Sugar Loaf.	9.96	8.12	8.00
1804 922	Northwestern Complete Compound, ---	Greenville Coal & Ice Co., Greenville.	11.22	8.94	8.00
921 1549	Northwestern High Grade General Fer- tilizer.	Greenville Coal & Ice Co., Greenville, Jefferson Altfather, Berlin, ---	12.69	9.06	8.00
691 1689	Pacific A No. 1 Phosphate, -----	J. O. Campbell, Big Run, --- Reuben Mitman, Perkaskie, ---	10.46	8.56	7.00
690 136	Pacific Potato Phosphate, -----	J. O. Campbell, Big Run, --- Bish Lansberry, Woodland, John P. Jones Hardware Co., Summerville.	11.70	6.47	6.00
1271 940	Packer's Union Animal Corn Fertilizer	C. E. Star, Three Springs, R. D. 2, James Bannen, Turbottsville, R. D.	10.22	9.15	9.00
599	Packer's Union Gardener's Complete Manure.	C. S. Brown, Mill Creek, --- W. Avery, Honesdale, -----	7.71	6.71	6.00
1241	Packer's Union Potato Manure, -----	J. Detrick, Milford, C. S. Brown, Mill Creek, R. D., -----	10.85 10.34	8.82 7.96	8.00 8.00
964 1696 1866	Packer's Union Universal Fertilizer,	J. Detrick, Milford, J. E. Bossard, Siegfried, R. D. 1.			
502 1900	Quinnipiac Mohawk Fertilizer, -----	F. H. Carl, Coopersburg, --- James S. Oulp, Indiana, -----	11.47	7.37	7.00
1311	Read's Farmers Friend Superphosphate.	O. L. Shambacker, East Point	13.43	9.58	8.00
35	Read's Leader B & B Fertilizer, -----	W. V. Shirk, Oakland Mills, ---	10.74	7.47	7.00
37	Read's Standard Superphosphate, -----	W. V. Shirk, Oakland Mills, ---	11.01	8.16	8.00
1645	Reese's Ammoniated Phosphate Mixture	Harry Wilson, Frazer, -----	10.50	9.51	9.00
1286 1214 1676	Reese's Potato Manure, -----	O. M. Honeywell, Dallas, --- Milton Neuman, York, ----- Isaac W. Holcomb, New Hope	9.08	9.38	9.00

†Composite sample.

LIZERS—Continued.

Acid in 100 Pounds.			Potash in 100 Pounds.				Nitrogen. in 100 lbs.		Computed commercial value of 2,000 pounds at Department rating.	Selling prices of 2,000 pounds at point of selection.	Sample number.
Insoluble.	Total.		Present as muriate.	Present as sulphate.	Total.		Found.	Guaranteed.			
	Found.	Guaranteed.			Found.	Guaranteed.					
.86	9.92	9.00	9.47	-----	*9.47	10.00	1.67	1.65	31.59	30.00	419
1.68	10.14	9.00	1.95	-----	1.95	1.50	*1.71	2.06	24.02	24.00 24.00	574 709
1.36	10.30	9.00	3.99	-----	3.99	4.00	.91	.82	22.58	+23.00	400
1.85	11.35	10.00	2.54	-----	2.54	2.00	2.51	2.47	29.59	25.00 26.50	1780 882
1.34	9.43	8.00	1.15	-----	1.15	1.00	.80	.82	18.33	21.00	706
1.53	10.08	9.00	6.09	-----	*6.09	7.00	3.10	3.29	34.98	+32.00 40.00 21.00	223 1335 572
1.12	9.78	9.00	4.88	-----	4.88	3.00	1.10	.82	24.03	+25.00	132
1.06	7.62	7.00	5.25	-----	5.25	5.00	1.34	1.23	23.42	23.00 24.00 27.00	707 1018 1482
1.64	9.76	9.00	9.69	-----	*9.69	10.00	1.64	1.65	31.28	+-----	1355
1.15	10.09	9.00	4.61	-----	4.61	4.00	1.02	.82	23.58	29.83 22.00	1804 922
1.02	10.06	9.00	4.23	-----	4.23	4.00	1.59	1.65	26.14	+26.00	921
1.15	9.70	8.00	1.50	-----	1.50	1.00	1.02	.82	20.01	24.00 +22.00	1579 691 1689
.86	7.32	7.00	5.61	-----	5.61	5.00	1.04	1.23	22.14	28.00 +24.00	690 135
1.66	10.81	10.00	2.14	-----	2.14	2.00	*2.26	2.47	27.52	24.00 28.00	1271 940
1.59	8.30	7.00	10.38	-----	10.38	10.00	3.36	3.29	38.65	+26.00 26.00 40.00	599 553 1241
1.96	10.77	9.00	5.87	-----	5.87	6.00	2.00	2.06	29.88	32.00	1698
1.77	9.75	9.00	4.07	-----	4.07	4.00	.79	.82	21.37	+20.00 25.00 18.00	854 1696 1865
1.54	8.91	8.00	1.31	-----	1.31	1.00	.82	.82	17.82	+19.00 20.00	502 1903
.54	10.12	9.00	3.25	-----	3.25	3.00	2.06	2.06	27.56	30.00	1311
.92	8.39	8.00	1.45	-----	1.45	1.00	.84	.82	18.01	17.50	35
.80	8.96	9.00	3.10	-----	*3.10	4.00	.80	.82	20.11	19.50	87
1.24	10.75	10.00	3.20	-----	3.20	3.00	.88	.82	22.28	22.00 30.00	1645 1266
1.52	10.90	10.00	7.26	-----	7.26	7.00	.84	.82	26.18	+22.80 28.00	1214 1676

*Constituent falls below guaranty.

COMPLETE FERTI

Sample number.	Manufacturer and Brand.	From Whom Sample Was Taken.	Moisture in 100 pounds.	Phosphoric	
				Available.	
				Pound.	Guaranteed.
309 1066 361	†Sharpless & Carpenter's Dissolved Fertilizer for Potatoes & General Use.	W. E. Knerr, Rough & Ready, A. B. Shoemaker, Tullytown, Farmers Supply Co., New Castle.	11.33	8.57	8.00
310 1289 410 319	†Sharpless & Carpenter's Farmers Brand Phosphate.	W. E. Knerr, Rough & Ready, J. L. Seagers, Westfield, J. C. Harrington, Montrose Mills.	13.12	8.86	8.00
971 1250 1668 1945	†Sharpless & Carpenter's Gilt Edge Potato & Tobacco Manure.	William Bardo, Larrys Creek, N. G. Adams, Paxinos, Jonas Kunkle, McKeansburg, A. B. Shoemaker, Tullytown, J. L. Seagers, Westfield,	10.04 11.90 12.48	8.33 8.25 7.84	8.00 8.00 7.00
308 63 437 1097	†Sharpless & Carpenter's No. 1 Brand Phosphate.	Sharpless & Carpenter's No. 2 for Grain and Grass.			
177 159 1109 436	†Sharpless & Carpenter's Potato, Corn and Truck Guano.	A. L. Burgstesser, Hallertown. John A. Williams, Friedensville. Jonathan Aelser, Thompson-town.	9.90	6.50	6.00
308 544 1076	†Sharpless & Carpenter's Soluble Tampeco Guano.	A. B. Shoemaker, Tullytown.	9.96	8.82	8.00
161 176 1079 114	†Susquehanna Ammoniated Phosphate.	Caleb Allen, Jennersville, J. N. Getz Co., Lock Haven, Henry Sunday, East Berlin, B. F. Gaymon, Thompson-town.	11.38	8.13	8.00
1754 307 180	†Susquehanna Crop Grower, -----	Harry Shadel, Klingertown, J. Warren Imler, Imler, -----	9.90	7.72	7.00
1011 1148 516 1149	Susquehanna High Grade Truck Mixture.	Ed. Schmalts, Richland, -----	8.75	7.15	6.00
1841	†Susquehanna Potato Phosphate, ---	J. N. Getz Co., Lock Haven, Caleb Allen, Jennersville, Henry Moyer, Oampbelltown, Z. Z. Peters, Guernsey Station.	11.06 10.44	8.50 8.26	8.00 8.00
53 149	†Susquehanna Special Potato & Tobacco Manure.	A. K. Stoltzfus, Morgantown, Harry Shadel, Klingertown, J. N. Getz Co., Lock Haven, J. P. Klingler, Middleburg, R. D.	10.73	8.42	8.00
150 667 656 655	†Susquehanna XXV Phosphate, -----	W. F. Meridith, Ship Road, Chas. Blyer, Sipestown, W. F. Meridith, Ship Road, Greenawalt & Benninghoff, Tripoli.	13.22 11.04 10.55 7.16	8.92 7.75 8.80 6.26	8.00 7.00 8.00 6.00
501 1228	Allen's Popular Phosphate, -----	H. B. Shaffee, Potterville, --	10.64	8.72	8.00
	Allen's Special for Wheat and Grass,	J. A. Gummo, Mill Hall, R. D. 1.	12.55	8.00	8.00
	Tygart Allen's Standard Brand Phosphate.	J. A. Gummo, Mill Hall, R. D. 1.	8.22	9.08	8.00
	†Wheeler's Corn Fertilizer, -----	H. A. Crossdale, Delaware Water Gap, -----	12.00	9.23	8.00
	Wheeler's Potato Manure, -----	H. A. Crossdale, Delaware Water Gap, -----			
	Williams & Clark's American Special High Grade Fertilizer.	H. A. Crossdale, Delaware Water Gap, -----			
	Williams & Clark's Americus Universal Fertilizer.	H. A. Crossdale, Delaware Water Gap, -----			
	†Williams & Clark's Good Grower Potato Phosphate.	E. H. Carl, Oopersburg, -- Gallupp & Co., Port Allegany.	9.64	7.00	6.00

†Composite sample.

LIZERS—Continued.

Acid in 100 Pounds.			Potash in 100 Pounds.				Nitrogen. in 100 lbs.		Computed commercial value of 2,000 pounds at Department rating.	Selling price of 2,000 pounds at point of selection.	Sample number.
Insoluble.	Total.		Present as muriate.	Present as sulphate.	Total.		Found.	Guaranteed.			
	Found.	Guaranteed.			Found.	Guaranteed.					
1.21	9.78	9.00	6.33	-----	6.33	6.00	2.06	2.06	30.07	126.50 26.00 24.00	309 1086 561
1.02	9.88	9.00	4.04	-----	4.04	4.00	.88	.82	22.38	120.50 26.00 32.00	310 1389 410
1.47	9.80	9.00	9.99	-----	9.99	10.00	1.65	1.65	31.74	32.00 23.00 25.00	319 971 1250
1.50	9.75	9.00	2.59	-----	2.59	2.00	1.68	1.65	24.34	22.00 17.50	1068 1945
1.34	8.68	8.00	1.65	-----	1.65	1.00	.84	.82	18.31	24.00	363
1.24	7.74	7.00	5.23	-----	5.23	5.00	1.32	1.23	23.23	128.10 20.60 35.00	63 437 1667
1.34	10.16	9.00	6.92	-----	6.92	7.00	3.22	3.29	36.43	22.00 126.00 22.00 17.50	177 159 1189 436
1.11	9.24	9.00	2.30	-----	2.30	2.00	1.59	1.65	23.28	120.00 18.50 35.00	308 544 1075
.96	8.68	8.00	1.42	-----	1.42	1.00	.92	.82	18.51	28.00 24.00	161 176
.83	7.98	7.00	10.78	-----	10.78	10.00	*3.08	3.29	38.00	127.00	1079 114
1.13	9.63	9.00	5.11	-----	5.11	5.00	1.58	1.65	26.52	22.00 124.00	1754 307 16)
1.34	9.60	9.00	10.04	-----	10.04	10.00	1.60	1.65	31.39	19.00	1011 1148
1.08	9.50	9.00	1.40	-----	1.40	1.00	.84	.82	19.00	18.55 25.40	516 1149
1.28	10.20	9.00	2.80	-----	2.80	2.00	.82	.82	20.80	22.00	1841
2.06	9.78	8.00	1.14	-----	1.14	1.00	.85	.82	18.55	24.27	58
1.35	10.15	9.00	8.15	-----	8.15	2.00	1.72	1.65	25.40	24.00 25.00	149 180
2.19	8.45	7.00	4.90	-----	4.90	5.00	*.91	1.23	21.19	31.55	657
1.21	9.98	9.00	2.40	-----	2.40	2.00	1.65	1.65	24.27	30.00	656
1.59	9.68	9.00	3.03	-----	3.03	3.00	2.06	2.06	26.88	20.00	656
.89	10.52	9.00	7.39	-----	7.39	7.00	3.27	3.29	37.77	25.00	501
.71	9.94	9.00	2.37	-----	2.37	2.00	1.68	1.65	24.73	28.00	1228
1.26	8.26	7.00	5.27	-----	5.27	5.00	1.26	1.23	23.49	28.00	

*Constituent falls below guaranty.

COMPLETE FERTI

Sample number.	Manufacturer and Brand.	From Whom Sample Was	Moisture in 100 pounds.	Phosphoric	
				Available.	
				Found.	Guaranteed.
354	Williams & Clark's Prolific Fertilizer,--	Frank Thompson, Beaver Falls	8.60	6.97	7.00
1582	Zell's Economizer Phosphate, -----	Pa. B. F. Horting, Newport, ---	10.47	8.30	8.00
1155	{Zell's Little Giant, -----	O. F. Arnold, Dillsburg, ---	10.04	7.86	7.00
9		John H. Reed, Roedersville, ---			
1793		Ohio Pyle Co., Ohio Pyle, ---			
1154	{Zell's Special Compound for Potatoes and Vegetables.	O. F. Arnold, Dillsburg, ---	10.80	8.64	8.00
1387		Roy Ackley, Sabinsville, -----			
AMERICAN FERTILIZER CO., BAL- TIMORE, MD.					
38	{American Champion Grain Grower, --	John Siever, Mifflintown, ---	9.96	8.82	8.00
738		Lancaster Co. Farmers' Asso- ciation, West Willow. ---			
40	{American Prize Truck Guano, -----	John Siever, Mifflintown, ---	9.06	8.46	8.00
732		Lancaster Co. Farmers' Asso- ciation, West Willow. ---			
41	{American Special Compound Guano,--	John Siever, Mifflintown, ---	8.57	7.84	7.00
897		Jones Eavenson, Christiansa, ---			
AMERICAN REDUCTION CO., PITTS- BURGH, PA.					
559	{Common Sense, -----	W. M. Tyson, -----	5.57	*6.75	7.00
1296		Scarboagh Klass Co., Pittsburg			
ARMOUR FERTILIZER WORKS, INC., BALTIMORE, MD.					
1704	{Crop Grower, -----	Kemmerer Co., Lehighton, --	10.24	8.08	8.00
513		Frank P. Barr, Slipstown, -- E. T. Denny & Co., Wayne- burg. ---			
1786	Blood, Bone, and Potash, -----	J. F. Onisholm, McKean, ---	7.23	8.07	8.00
1408		S. G. Updegraff, Williams- port. ---			
826	{5 Per Cent. Trucker, -----	Lot Shoemaker, Nichols, ---	8.43	8.42	8.00
49		N. Y. ---			
1530		J. H. Frank, Bellgrove, ---			
253	{High Grade Potato, -----	Saul Brinser, Middletown, ---	9.57	8.09	8.00
50		Lot Shoemaker, Nichols, ---			
324		N. Y. ---			
296	Royal Ammoniated, -----	S. G. Updegraff, Williams- port. ---	8.30	8.60	8.00
1296		Heffner & Luckenbill, Fried- ensburg. ---			
1230	{Superior, -----	James W. Merritt, Granville Summit. ---	7.50	8.40	8.00
1399		J. I. Yetter, Saylorsburg, ---			
714	{Wheat, Corn & Oats Special, -----	F. G. Mohring, North Glard, ---	7.96	7.66	7.00
296		B. W. Fetzer, Brookville, ---			
846	{Wheat and Grass Special, -----	Heffner & Luckenbill, Fried- ensburg. ---	8.56	7.80	7.00
1228		Heebner, Hoover & Co., Du- Bois. ---			
908		J. I. Yetter, Saylorsburg, ---			
1296		J. G. Walker & Sons Co., Gap, -----			
		James W. Merritt, Granville Summit. ---			

†Composite sample.

LIZERS—Continued.

Acid in 100 Pounds.			Potash in 100 Pounds.				Nitrogen. in 100 lbs.		Computed commercial value of 2,000 pounds at Department rating.	Selling price of 2,000 pounds at point of selection.	Sample number.
Insoluble.	Total.		Present as muriate.	Present as sulphate.	Total.		Found.	Guaranteed.			
	Found.	Guaranteed.			Found.	Guaranteed.					
.98	7.96	8.00	1.23	-----	1.23	1.00	.94	.82	17.80	20.00	354
1.49	9.79	9.00	2.26	-----	2.26	2.00	.96	.82	20.44	17.00	1532
1.29	9.15	8.00	1.50	-----	1.50	1.00	.90	.82	18.88	18.50 17.00	1155 9
1.02	9.66	9.00	4.16	-----	4.16	4.00	2.51	2.47	29.94	24.00 22.00 30.00	1793 1154 1287
1.42	10.24	9.00	4.32	-----	4.32	4.00	1.02	.82	23.29	20.00 17.50	38 733
1.25	9.71	9.00	10.11	-----	10.11	10.00	1.52	1.65	31.12	27.00 25.00	40 732
1.15	8.99	9.00	8.39	-----	8.39	3.00	.58	.41	19.30	16.00 17.00	41 897
2.44	9.19	8.00	1.81	-----	1.81	1.00	1.11	1.22	18.56	18.00 20.00	559 1295
1.15	9.23	8.50	2.37	-----	2.37	2.00	.78	.82	19.96	22.00 19.00	1704 513
12.89	20.96	8.50	5.78	-----	*5.78	7.00	*3.08	4.11	39.60	23.00 40.00 40.00	1786 1408 326
.70	9.12	8.50	5.73	1.52	7.25	7.00	3.92	4.11	39.69	138.00 40.00 27.25	49 1539 253
.65	8.74	8.50	10.05	-----	10.05	10.00	1.48	1.65	30.43	130.00	50
.64	9.24	8.50	4.14	-----	4.14	4.00	.90	.82	22.04	32.00 23.00	321 226
.94	9.34	8.50	7.15	-----	7.15	7.00	.92	.82	25.04	24.00 23.00 25.00 22.00	1236 1230 1399 714
.82	8.48	7.80	1.10	-----	1.10	1.00	.83	.82	17.85	21.00 22.00 20.00	298 846 1228
.64	8.44	7.50	5.56	-----	5.56	5.00	.96	.82	22.39	120.00 22.00	908 1290

*Constituent falls below guaranty.

COMPLETE FERTI

Sample number.	Manufacturer and Brand.	From Whom Sample Was Taken.	Moisture in 100 pounds.	Phosphoric	
				Available.	
				Found.	Guaranteed.
105	ATLANTIC FERTILIZER CO., THE. BALTIMORE, MD. Atlantic Standard Compound, ...	Biglerville Warehouse Co., Biglerville.	10.47	8.75	8.00
602	†Arrow Brand Special, ...	J. C. Lebo, Millersburg, ...	7.56	9.13	8.00
1449		J. H. Bartenslager, Stewartstown.			
1441	Gold Medal Superior for All Crops, ..	Grove & Uffelman, Brogueville Station, ...	9.11	8.58	8.00
1442	Royal Potato and Tomato Manure, ..	Grove & Uffelman, Brogueville Station, ...	7.10	*6.68	7.00
998	B. S. AUCKER, SHAMOKIN, PA. Grade B. Bone and Slaughterhouse Phosphate.	J. A. Hendricks & Son, Selinsgrove.	6.83	*8.29	8.71
995	Grade D. Bone and Slaughterhouse Phosphate.	J. A. Hendricks & Son, Selinsgrove.	7.49	9.15	8.90
996	High Grade Bone and Slaughterhouse Phosphate.	J. A. Hendricks & Son, Selinsgrove.	5.94	10.16	9.73
997	High Grade Potash Ammoniated Potato & Truck Phosphate.	J. A. Hendricks & Son, Selinsgrove.	7.54	9.05	8.90
1661	WILLIAM C. BALL, MEDIA, PA. Ball's Potato Manure, ...	William C. Ball, Media, ...	10.53	7.06	7.00
1662	Ball's \$25.00 Goods, ...	William C. Ball, Media, ...	12.68	8.67	8.00
1448	J. H. BARTENSCHLAGER, STEWARTSTOWN, PA. Bartenschlager's Potato, Tobacco and Vegetable Compound.	J. H. Bartenschlager, Stewartstown.	6.92	*6.72	8.00
948	BAUGH & SONS CO., PHILADELPHIA, PA.				
380	†Baugh's Ammoniated Soluble Alkaline	L. J. Meyers, Orbisonia, --- J. W. Gearhart, Blue Ball, --- Allison & Fogelsonger, Shipensburg.	7.08	8.59	8.00
1085					
1964	†Baugh's Animal Base & Potash Compound.	A. Cook & Co., Dillsburg,---	6.20	8.48	8.00
1142	Baugh's Balanced Plant Food. (A superior fertilizer for general use.)	John H. McGowan, Elverson,	11.34	11.87	10.50
1052	Baugh's Commercial Superphosphate (for general use.)	J. A. Miller, Oakville, ...	7.15	*7.11	8.00
402					
157	†Baugh's Complete Animal Base Fertilizer.	Jonas Shaffer, Luthersburg, --- E. H. Hays, Lamar, ...	8.32	8.67	8.00
625		W. E. Erwin, Somerton, ...			
608		J. A. Romberger, Elizabethville.			
99	†Baugh's Double Eagle \$25.00 Phosphate.	N. D. & Z. F. Brean, Gettysburg.	9.00	9.28	8.50
686		W. E. Erwin, Somerton, ---			
188		E. H. Keen, Parkersburg, ---			
127	†Baugh's Excelsior Guano, ...	Routch & Swartzel, Clearfield,	8.00	8.90	8.00
408		Jonah Shaffer, Luthersburg, ---			
531		Herman Keeler, Montoursville.			
100	†Baugh's General Crop Grower (for all Crops.)	N. D. & Z. F. Brean, Gettysburg.	6.25	7.87	8.00
496		S. K. Mohr, Coopersburg, ---			
1455	†Baugh's Grand Rapid High Grade	James Fulton & Sons Co.,	8.75	8.33	8.00
1941	Truck Guano.	Stewartstown.			
		H. L. Stultz, Hollidaysburg,			

†Composite sample.

LIZERS—Continued.

Acid in 100 Pounds.			Potash in 100 Pounds.				Nitrogen. in 100 lbs.		Computed commercial value of 2,000 pounds at Department rating.	Selling price of 2,000 pounds at point of selection.	Sample number.
Insoluble.	Total.		Present as muriate.	Present as sulphate.	Total.		Found.	Guaranteed.			
	Found.	Guaranteed.			Found.	Guaranteed.					
2.46	11.21	9.00	2.64	-----	2.64	2.00	*1.84	1.65	23.68	21.00	105
1.11	10.24	9.00	4.29	-----	4.29	4.00	.77	.82	24.26	†22.00	602
1.29	9.87	9.00	3.18	-----	3.18	3.00	1.90	1.65	26.16	20.00	1449
1.06	8.34	8.00	5.95	-----	5.95	5.00	1.67	1.65	26.02	20.75	1441
2.74	11.03	10.67	3.78	-----	3.78	3.06	*1.08	1.61	23.35	22.50	1442
2.23	11.38	9.60	3.25	-----	3.25	3.39	1.06	1.20	23.17	26.00	998
2.23	12.39	11.69	4.51	-----	4.51	3.80	1.86	1.61	29.28	22.00	995
1.91	10.96	8.75	5.01	-----	5.01	4.90	*.75	1.20	23.24	30.00	996
1.15	8.21	-----	8.58	-----	*8.58	10.00	*1.15	1.44	26.43	19.00	997
.82	9.49	-----	5.73	-----	5.73	5.00	.77	.82	23.13	29.00	1661
2.40	9.12	9.00	5.76	-----	5.76	5.00	*1.25	1.65	24.26	24.00	1662
.54	9.13	-----	2.75	-----	2.75	2.00	.62	.41	19.12	18.75	945
										†18.00	839
										17.00	1035
1.02	9.50	-----	2.31	-----	2.31	2.00	1.86	1.65	24.79	21.75	1964
1.11	12.98	-----	6.82	-----	6.82	7.00	1.55	1.65	31.39	27.00	1142
1.21	8.32	-----	6.98	2.43	*9.36	10.00	*1.40	1.65	28.92	28.00	1052
1.36	10.03	-----	5.19	-----	5.19	5.00	1.64	1.65	27.09	26.00	403
										†26.50	157
										27.00	625
										21.00	603
1.80	11.08	-----	1.36	-----	1.36	1.00	1.73	1.65	23.61	†23.00	99
										24.00	626
1.30	10.20	-----	4.79	-----	4.79	4.00	1.08	.82	24.04	20.00	138
										†23.00	127
1.08	8.90	-----	1.41	-----	1.41	1.00	1.01	.82	19.17	22.00	403
										19.00	831
										†19.50	100
										20.00	496
.87	9.30	-----	3.60	-----	3.60	3.00	2.34	2.47	28.23	†25.00	1455
										32.00	1941

*Constituent falls below guaranty.

COMPLETE FERTI

Sample number.	Manufacturer and Brand.	From Whom Sample Was Taken.	Moisture in 100 pounds.	Phosphoric	
				Available.	
				Found.	Guaranteed.
868	{Baugh's Peruvian Guano Substitute (For Potatoes and all Vegetables.)	C. S. Richards, Ransom, ---	8.41	7.22	6.00
1678		Wm. Hobensack, Ivyland, ---			
867		C. S. Richards, Ransom, ---	11.59	8.08	7.00
228	{Baugh's Special Potato Manure, ----	H. H. Bennett, Easton, ---			
128		Routch & Swartzel, Clearfield, ---	6.20	5.83	5.00
404		Jonah Shaffer, Luthersburg, ---			
1566	Baugh's Wheat Fertilizer for Wheat & Grass.	Geo. S. Endslow, Blain, ---	7.36	8.69	8.00
800	{Baugh's Wrapper Leaf Brand (A special manure for seed leaf tobacco	John Ravene, Watsonstown, ---			
903		R. D. 2.	5.10	8.75	3.50
		G. Moyer, Mt. Joy, ---			
1663	HENRY V. BAXTER, CHESTER, PA. I. X. L. Phosphate, -----	Henry V. Baxter, Chester, ---	4.22	8.47	7.00
	BERG CO., THE, PHILADELPHIA, PA.				
1651	{Berg's High Grade Potato Manure, ---	Edward F. Bracken, Paoli, ---	8.17	7.77	7.00
764		A. B. Groff, New Holland, ---	6.76	7.97	7.00
1653		Edward F. Bracken, Paoli, ---			
765	Berg's Tobacco Manure, -----	A. B. Groff, New Holland, ---	5.87	7.88	8.00
	BERGER BROS., EASTON, PA.				
217	Lehigh Super Phosphate, -----	John S. Osterstack, Easton, Pa.	10.98	9.71	7.00
232	Potato & Truck Special Phosphate, ---	J. M. Kiefer, Easton, -----	11.28	10.01	7.00
	D. BLOCHER & CO., GETTYSBURG, PA.				
93	Ammoniated Soluble Phosphate, -----	Z. N. Wiernan, Gettysburg, -	7.47	9.36	9.00
94	High Grade Super Phosphate, -----	Z. N. Wiernan, Gettysburg, -	8.46	9.68	9.00
	BOWKER FERTILIZER CO., NEW YORK CITY.				
563	{Bowker's Corn and Grain Grower, ---	Marshall Bros., New Castle, -			
241		L. F. Harris, Ft. Hunter, ---	10.40	8.09	8.00
754		A. L. Herr, Quarryville, ---			
1333	{Bowker's Farm & Garden Phosphate,	J. W. Howhart, Warren, ---	11.02	8.45	8.00
1854		D. Beltz, Wiseport, -----			
1093		Kernochan & Co., Titusville, -			
978	{Bowker's Hill & Drill Phosphate, ----	J. A. Kimbel, Elysburg, ---	13.77	9.76	9.00
1301		H. M. Spaulding & Son, Troy, ---			
1430		J. C. Matern, Stormstown, ---	13.93	10.07	10.00
1281	{Bowker's Lawn & Garden Dressing, ---	R. F. D.			
		W. C. Beckert, Pittsburg, ---	7.42	5.60	4.00
		N. S.			
565	{Bowker's Market Garden Fertilizer, ---	Marshall Bros., New Castle, -			
242		L. F. Harris, Ft. Hunter, ---	8.15	6.84	6.00
976		J. A. Kimbel, Elysburg, ---			
756	Bowker's Potash Fertilizer, -----	A. L. Herr, Quarryville, ---	9.90	6.96	6.00
1633	Bowker's Potash or Staple Phosphate, ---	C. F. Craig, Silgo, -----	12.16	8.66	8.00
975	{Bowker's Potato & Vegetable Fer- tilizer.	J. A. Kimbel, Elysburg, ---	11.37	8.96	8.00
1758		B. F. Fink, Huntingdon, ---			
249		L. G. Landis, Paxtonia, ---	11.38	9.14	8.00
974	{Bowker's Potato & Vegetable Phos- phate.	J. A. Kimbel, Elysburg, ---			
244		L. G. Landis, Ft. Hunter, ---			
144		W. A. Mays, Houtzdale, ---	9.64	6.78	6.00
345	{Bowker's 6 Per Cent. Potato Fer-	C. S. Hunter Co., Washing- ton.			

{Composite sample.

LIZERS—Continued.

Acid in 100 Pounds.			Potash in 100 Pounds.				Nitrogen. in 100 lbs.		Computed commercial value of 2,000 pounds at Department rating.	Selling price of 2,000 pounds at point of selection.	Sample number.
Insoluble.	Total.		Present as muriate.	Present as sulphate.	Total.		Found.	Guaranteed.			
	Found.	Guaranteed.			Found.	Guaranteed.					
1.21	8.43		7.35		7.35	7.00	*3.88	4.12	38.52	{ 137.00 38.00 37.00	868 1678 867
1.11	9.19		7.38		7.36	7.00	3.05	2.88	35.34	{ 32.50 129.00 28.00	238 129 404 1566
1.49	7.32		10.30		10.30	10.00	1.73	1.65	30.09		
.79	9.48		2.36		2.36	2.00	1.76	1.65	24.46		
1.96	5.71		7.38		7.38	5.00	*2.48	3.30	29.71	{ 28.00	800 908
4.25	12.73	11.00	5.71		5.71	5.00	1.49	1.65	28.08	27.00	1663
3.91	11.68		8.45		*8.45	10.00	*2.30	3.00	33.88	36.00	1651
4.71	12.68		3.38		3.88	3.00	*1.39	2.00	25.00	{ 124.00 20.00 29.00	764 1653 765
3.30	11.18		5.01		*5.01	6.00	3.79	3.00	37.39		
1.58	11.29		4.42		4.42	4.00	1.62	1.65	27.24	25.00	217
1.44	11.45		5.89		5.89	6.00	*1.80	2.04	29.96	30.00	232
1.96	11.32	11.00	2.44		2.44	1.50	.50	.41	19.77	17.00	93
1.96	11.64	11.00	2.05		2.05	2.00	*.92	1.38	21.64	20.00	94
1.28	9.37	9.00	4.20		4.20	4.00	.93	.82	22.14	{ 24.00 120.50 23.00 126.00 23.00 32.00 126.00 28.00	568 211 754 1333 1854 1093 978 1301 1430
1.49	9.94	9.00	3.02		3.02	2.00	*1.29	1.65	23.04		
1.28	11.04	10.00	2.25		2.25	2.00	2.39	2.47	28.78		
.78	10.85	11.00	6.10		6.10	6.00	1.41	1.23	27.98		
16.83	22.43	8.00	2.51		*2.51	5.00	*1.76	3.26	29.16	40.00	1281
.94	7.78	7.00	9.56		*9.56	10.00	2.56	2.47	33.90	{ 37.00 130.00 32.00 20.00 23.00 128.00 36.00 123.00 28.50 24.00	565 242 976 756 1683 975 1758 249 974 244 144
1.64	8.80	7.00	2.21		2.21	2.00	.95	.82	19.09		
1.28	9.94	9.00	3.98		3.98	3.00	.94	.82	22.48		
1.40	10.36	9.00	4.43		4.43	4.00	2.44	2.47	30.50		
.83	9.97	9.00	2.48		2.48	2.00	1.63	1.65	24.62		
1.16	7.94	7.00	5.58		*5.58	6.00	1.17	.82	23.12	{ 27.00	345

*Constituent falls below guaranty.

COMPLETE FERTI

Sample number.	Manufacturer and Brand.	From Whom Sample Was Taken.	Phosphoric		
			Moisture in 100 pounds.	Available.	
				Found.	Guaranteed.
1985	Bowker's Special Grain and Vegetable Mixture.	A. Hostettler, Scalp Level, --	6.50	7.91	7.00
690	Bowker's Sure Crop Phosphate.	J. H. Cooke, Brush Hill, ...	9.74	9.43	9.00
143	†Stockbridge's Special Complete Man-	W. A. Mays, Houtzdale, ...	7.77	*8.68	10.00
1299	ure for Corn and all Grain Crops.	Harry Harned, Wyoming, ...			
243		L. G. Landis, Ft. Hunter, ...			
65	†Stockbridge's Special Complete Man-	P. L. Touhey, Little Mea-	9.90	6.83	6.00
497	ure for Potatoes and Vegetables.	dows.			
		Geo. Maurer, Pitman, ...			
	S. B. BRODBECK, BRODBECKS, PA.				
1464	Brodbeck's Reliable, ...	B. F. Goodwin, New Freedom, ..	8.14	8.40	8.00
1465	Brodbeck's Special Potato, ...	B. F. Goodwin, New Freedom, ..	8.98	8.44	8.00
	BUFFALO FERTILIZER CO., THE, BUFFALO, N. Y.				
586		M. Gills, Hughesville, ...			
408	†Celery & Potato Special, ...	E. H. Harmon, DuBois, ...	10.18	8.82	8.00
		Reynoldsville Hdq. Co., Rey-			
700		noldsville.			
598		J. A. Cover, ...			
460	†Farmer's Choice, ...	A. L. Grove, Mifflinburg, ...	12.09	8.12	8.00
586		M. Gills, Hughesville, ...			
925		Asa McDonald, Greenville, ...			
819	†Fish Guano, ...	J. A. Gass, Sunbury, ...	14.85	9.74	9.00
1907		Elcher & Graft, Scottdale, ...			
1963	Garden Truck, ...	Foster Strong, Columbia Cross	9.02	8.24	8.00
		Roads.			
841		E. H. Harmon, DuBois, ...			
913	†Ideal Wheat and Corn, ...	H. B. Hoon, Mercer, ...	14.24	10.84	9.00
1313		Snyder Bros., Liberty, ...			
	OHESAPEAKE CHEMICAL CO., THE, BALTIMORE, MD.				
482	†C. C. Co.'s English Mixture, ...	Jacob J. Romberger, Rough & Ready.			
1542		Ordered from factory for own use by Elias Gerhart, Jones-	7.93	8.11	8.00
		town.			
311	C. C. Co.'s Farmer's Favorite, ...	Jacob J. Romberger, Rough & Ready.	6.11	7.57	7.00
312	O. C. Co.'s Imperial Guano, ...	Jacob J. Romberger, Rough & Ready.	7.15	8.41	8.00
		Jacob J. Romberger, Rough & Ready.			
491	†C. C. Co.'s National Crop Grower, ..	Ordered from factory for own use by Elias Gerhart, Jones-	9.37	8.08	8.00
1543		town.			
	COE-MORTIMER CO., THE, NEW YORK, N. Y.				
892	†E. Frank Coe's Columbian Corn and	T. F. Kunsman, Hellertown, ..	9.99	9.00	8.99
1082	Potato Fertilizer.	Tucker & Squires, Springboro, ..			
1051		Tucker & Squires, Springboro, ..			
961	†E. Frank Coe's Gold Brand Excelsior	T. F. Kunsman, Hellertown, ..	10.78	8.11	8.00
1092	Guano.	James Montgomery, Millford, ..			

†Composite sample.

LIZERS—Continued.

Acid in 100 Pounds.			Potash in 100 Pounds.				Nitrogen. in 100 lbs.		Computed commercial value of 2,000 pounds at Department rating.	Selling price of 2,000 pounds at point of selection.	Sample number.
Insoluble.	Total.		Present as muriate.	Present as sulphate.	Total.		Found.	Guaranteed.			
	Found.	Guaranteed.			Found.	Guaranteed.					
9.55	17.46	15.50	3.80	2.18	*5.98	8.00	*1.64	1.85	31.48	29.00	1985
2.56	11.99	10.00	2.52		2.52	2.00	.90	.82	22.14	25.00	690
1.23	*9.91	11.00	8.73		8.73	7.00	*2.83	3.29	36.43	34.00	143
										84.00	1269
1.62	7.95	7.00	9.50		*9.50	10.00	3.21	3.29	36.70	33.00	243
										23.30	65
											487
1.06	9.46	9.00	2.33		2.33	2.00	.55	.41	18.51	16.00	1464
1.02	9.46	9.00	4.09		4.09	4.00	1.00	.82	22.48	19.00	1466
1.19	10.01	9.00	9.51		*9.51	10.00	1.58	1.60	31.83	29.00	588
										30.00	408
										33.00	700
1.31	9.43	9.00	5.25		5.25	5.00	.80	.80	22.53	25.00	563
										30.00	480
										22.00	585
1.86	11.60	10.00	2.37		2.37	2.00	.80	.80	21.48	22.50	923
										24.00	816
1.21	9.45	9.00	7.26		7.26	7.00	*3.00	3.30	34.22	24.00	1607
										35.00	1953
1.04	11.88	10.00	5.11		5.11	5.00	1.52	1.60	28.38	25.00	841
										26.50	915
										30.00	1313
1.97	10.08	10.00	5.08		5.08	5.00	.92	1.00	23.16	21.70	493
1.69	9.26	8.75	4.41		4.41	4.00	.96	.82	22.09	20.35	1542
1.85	10.26	10.00	3.09		3.09	2.00	.57	.41	19.66	16.75	311
1.78	9.81	10.00	3.16		3.16	2.00	*1.42	1.64	20.96	21.55	312
											481
											1542
1.47	10.47	9.50	2.62		2.62	2.50	1.10	1.23	22.21	21.00	363
										23.00	1062
										32.00	1061
.75	8.86	9.00	5.98		5.98	6.00	2.50	2.47	31.15	30.00	361
										29.30	1601

*Constituent falls below guaranty.

COMPLETE FERTI

Sample number.	Manufacturer and Brand.	From Whom Sample Was Taken.	Moisture in 100 pounds.	Phosphoric	
				Available.	
				Found.	Guaranteed.
1280 1086 1273	†Peruvian Vegetable Grower, Peruvian Guano Base.	A. H. Cobleigh, Alderson, -- Tucker & Squires, Springboro, I. W. Scott & Co., Pittsburg,]	6.91	8.18	8.00
1647	HENRY OPE & CO., LINCOLN UNIVERSITY, PA. Potato and Corn Phosphate, -----	Thomas Haines & Co., Malvern.	10.60	8.83	7.00
675 1043 891 677 1188 679 674 680 894	JOSIAH OPE & CO., BALTIMORE, MD. †Ammoniated Phosphate, ----- †Potato and Tobacco Phosphate, ---- Try Me Fertilizer, ----- Pure Bono Phosphate, ----- †Wheat and Grass Special, -----	Geo. Ehret, Coal Hill, ----- Harry Wilson, Fraser, Jones Eavenson, Christiana., Geo. Ehret, Coal Hill, ----- Frank Miller, Conestoga, ---- Geo. Ehret, Oil City, ----- Geo. Ehret, Coal Hill, ----- Geo. Ehret, Oil City, ----- Jones Eavenson, Christiana.,]	10.00 10.02 10.60 10.11 10.58	8.54 10.87 8.57 9.70 9.03	8.00 10.00 8.00 9.00 8.00
632 1699 1679 1680 631 1587	JAMES G. DOWNWARD CO., THE, COATESVILLE, PA. Ammoniated Phosphate, ----- †Special Corn Manure, ----- Special Mixture, ----- †Special Potato Fertilizer, -----	Harry O. Hibbs, Hulmerville, Frank R. Wright, Edgeley, -- J. E. Underwood, Ivyland, -- J. E. Underwood, Ivyland, -- Harry O. Hibbs, Hulmerville, A. G. Lehman, Campbelltown,]	8.67 11.92 12.53 10.00	7.75 7.91 7.83 7.68	7.00 7.00 6.00 7.00
766	AMOS EBY & CO., LEAMAN PLACE, PA. Pequea Economy, -----	Harvey S. Eby, Refton, ----	7.46	9.23	9.00
1397 1396 1398	ERIE REDUCTION CO., THE, ERIE, PA. Erie Cabbage Special, ----- Erie Corn and Oats Special, ----- Erie Potato Special, -----	F. G. Mohring, North Girard, F. G. Mohring, North Girard, F. G. Mohring, North Girard,	7.58 7.29 9.20	10.59 9.95 8.53	8.00 8.00 7.00
615 511 885 753 32 1094 478 479 14 614	EUREKA FERTILIZER CO., THE, FERRYVILLE, MD. †Corn and Potato Special, ----- †Complete Compound, ----- Grain and Grass Mixture, ----- †High Grade Trucker, -----	L. Arnold, Elizabethtown, -- Jonas P. Acker, Breinigsville, A. N. Wittes, Waterfall, ---- H. O. Breckbill, Strasburg, -- John Hartman, McKnightown, -- S. A. Hostetler, Belleville, -- L. Arnold, Pionts Valley, ---- L. Arnold, Pionts Valley, ---- M. H. Boyer, Pine Grove, ---- L. Arnold, Elizabethtown, -- Levi Stofer, Kleinfeltersville, J. H. Bartenschlager, Stewartstown.	8.45 8.21 7.36 8.01 8.64	8.75 7.99 8.19 8.29 8.23	9.00 7.00 8.00 8.00 8.00
1074 1447 761	†Imperial Phosphate, -----	New Providence Coal Co., New Providence.	7.81	7.40	8.00
477 1069	†Potato and Vegetable, -----	L. Arnold, Pionts Valley, ---- D. J. Beitzel, Mechanicsburg,]	7.81	7.40	8.00
1010 889	W. S. FARMER & CO., BALTIMORE, MD. W. S. Farmer & Co.'s Clyde Brand, -- W. S. Farmer & Co.'s Potato and Tobacco Phosphate.	J. A. Eichman, Globe Mills, -- Francis Baker, Everett, -----	11.52 10.90	8.25 7.75	8.00 8.00

†Composite sample.

LIZERS—Continued.

Acid in 100 Pounds.			Potash in 100 Pounds.				Nitrogen. in 100 lbs.		Computed commercial value of 2,000 pounds at Department rating.	Selling price of 2,000 pounds at point of selection.	Sample number.
Insoluble.	Total.		Present as muriate.	Present as sulphate.	Total.		Found.	Guaranteed.			
	Found.	Guaranteed.			Found.	Guaranteed.					
1.29	9.47	9.00	1.60	7.42	9.02	9.00	3.34	3.30	39.98	{ 38.00 142.00 44.00	1280 1086 1272
.98	9.81	9.00	5.17	-----	5.17	4.00	*1.00	1.25	23.91	24.00	1647
.99	9.55	9.00	3.37	-----	3.37	3.00	.84	.82	21.10	{ 125.00 22.00 26.00 124.00 23.00	675 1643 891 677 1138
1.19	12.06	11.00	6.81	-----	6.81	7.00	.91	.82	27.30	{ 28.00 28.00 30.00 20.53	679 674 680 894
1.50	10.07	9.00	4.59	-----	4.59	4.00	1.60	1.65	26.22	{ 26.00 25.00 30.00 23.43	632 1669 1679 1680
4.30	14.00	13.50	3.97	-----	3.97	4.00	2.00	1.85	30.00	{ 28.00 30.00 23.43	674 680 631
1.13	10.16	9.00	.42	1.11	1.53	1.00	.95	.82	20.53	{ 123.00 18.60	1537
1.28	9.03	8.00	3.02	-----	*3.02	3.50	1.04	.82	21.03	{ 25.00 129.00 25.00 30.00 23.43	632 1669 1679 1680 631
1.21	9.12	8.00	3.14	-----	*3.14	3.50	1.62	1.65	23.94	{ 25.00 30.00 23.43	1537
.85	8.68	-----	7.13	-----	7.13	1.00	2.69	.41	38.07	{ 28.00 23.43	631
.80	8.48	8.00	5.42	-----	5.42	5.00	1.11	1.24	23.43	{ 27.00	1537
1.34	10.62	11.00	3.45	-----	3.45	2.50	1.67	1.65	25.92	24.00	763
1.20	11.79	9.00	4.02	-----	4.02	4.00	*1.35	1.65	26.35	25.00	1397
.40	10.35	9.00	4.53	-----	4.53	4.00	.74	.82	32.99	22.00	1398
2.61	11.19	8.00	7.68	-----	*7.68	10.00	*2.10	2.47	32.36	32.00	1398
1.42	10.17	10.00	3.34	-----	3.34	3.00	.89	.82	21.74	{ 122.00 24.00 22.00 120.00 22.00 17.00 25.00 130.00 30.00	615 511 835 753 82 1024 478 479 14 614
1.53	9.52	8.00	4.87	-----	4.87	5.00	.96	.82	22.81	{ 22.00 22.00 17.00 25.00 130.00 30.00	82 1024 478 479 14 614
1.72	9.91	9.00	2.21	-----	2.21	2.00	.96	.82	20.38	{ 22.00 22.00 17.00 25.00 130.00 30.00	82 1024 478 479 14 614
.58	9.17	9.00	8.88	-----	*8.88	10.00	*1.44	1.65	29.32	{ 22.00 22.00 17.00 25.00 130.00 30.00	82 1024 478 479 14 614
1.66	9.94	9.00	1.87	-----	1.87	1.00	*.59	.82	18.43	{ 121.00 17.00 24.00	1074 1447 761
1.34	*8.74	9.00	4.16	-----	4.16	4.00	1.57	1.65	24.27	{ 24.00	477 1069
1.15	9.50	9.00	2.56	-----	2.56	2.00	.85	.82	20.16	18.00	1010
1.25	9.00	9.00	9.35	-----	*9.35	10.00	1.61	1.65	30.13	20.50	889

*Constituent falls below guaranty.

COMPLETE FERTI

Sample number.	Manufacturer and Brand.	From Whom Sample Was Taken.	Moisture in 100 pounds.	Phosphoric	
				Available.	
				Found.	Guaranteed.
FARMERS FERTILIZER WORKS, ELIZABETHTOWN, PA.					
265	†Grain and Grass Special, -----	C. B. Gochnauer, Lititz, -----	7.34	8.57	8.00
617		John Sheetz, Elizabethtville, -----			
33	†Pride of Donegal, -----	W. V. Shirk, Mifflin, -----	5.43	7.54	7.00
286		C. B. Gochnauer, Lititz, -----			
904	Potato, Tobacco and Truck Manure, -----	H. S. Newcomer, Mt. Joy, -----	9.04	10.44	10.00
618	†Special Compound, -----	John Sheetz, Elizabethtville, -----	6.70	7.33	7.00
905		H. S. Newcomer, Mt. Joy, -----			
267	Special Potato and Tobacco Manure, -----	C. B. Gochnauer, Lititz, -----	6.89	6.73	6.00
GRIFFITH & BOYD CO., BALTIMORE, MD.					
278	†Ammoniated Bone Phosphate, -----	Bear & Long, Lititz, -----	10.20	8.06	8.00
476		Adam King, Allenwood, -----			
816		J. H. Nichols, Avia, -----			
279	†Double Strength Tobacco Grower, -----	Bear & Long, Lititz, -----	8.82	8.46	8.00
1219		G. H. Wolfs Sons, Mt. Wolf, -----			
433		John W. Hostettler, Walnut, -----			
314	†Farmers Potato Manure, -----	J. H. Nichols, Avia, -----	9.62	7.95	8.00
721		E. B. Ruhl & Son, Manheim, -----			
1057	Fruit and Root Compound, -----	A. B. Harnish, Mechanicsburg, -----	9.50	9.00	7.00
277	Gilt Edge Crop Guano, -----	Bear & Long, Lititz, -----	4.77	8.14	8.00
748		W. C. Herr, Strassburg, -----			
316	†Spring Crop Grower, -----	J. H. Nichols, Avia, -----	8.15	7.62	6.50
1056		A. B. Harnish, Mechanicsburg, -----			
788	†Valley Fertilizer, -----	E. B. Ruhl & Son, Manheim, -----	9.43	9.23	8.00
798		S. F. Ludwig, Milton, R. D., -----			
FRANK HARTRANFT, COATESVILLE, PA.					
169	Potato Phosphate, -----	Preston Powell, Jennersville, -----	10.47	*6.39	8.00
170	Special Phosphate, -----	Preston Powell, Kilton, -----	11.96	*8.06	10.00
171	Spring Crop Grower Phosphate, -----	Preston Powell, West Grove, -----	11.77	*8.56	10.00
S. M. HESS & BROTHER, INC., PHILADELPHIA, PA.					
45	Potato and Truck Manure, -----	W. W. Book, Port Royal, -----	11.67	8.58	8.00
281		Benj. Weldner, Lititz, -----			
179	†Special Compound, -----	James B. Gillilan, Cochraneville, -----	10.29	8.10	8.00
492		Daniel Kimmel, Mabel, -----			
151		Howard Stamm, Rosecrans, -----			
46	†Special Corn Manure, -----	W. W. Book, Port Royal, -----	11.34	8.24	8.00
180		Jas. B. Gillilan, Cochraneville, -----			
551	†Special Potato Manure, -----	Ira Price, Everett, -----	9.76	8.08	8.00
1575		Elijah Livengood, Salsbury, -----			
282	Tobacco Manure, -----	Benj. Weldner, Lititz, -----	9.59	8.73	8.00
1403		Jacob Zaun, Fairview, -----			
290	†Keystone Phosphate, -----	McGee Feed Co., Oil City, -----	10.23	8.42	8.00
1863		O. Roth, Bowmanstown, -----			
HOLMES SEED CO., HARRISBURG, PA.					
255	Holmes Lawn Dressing, -----	Holmes Seed Co., Harrisburg, -----	4.89	8.89	-----

†Composite sample.

LIZERS—Continued.

Acid in 100 Pounds.			Potash in 100 Pounds.				Nitrogen. in 100 lbs.		Computed commercial value of 2,000 pounds at Department rating.	Selling price of 2,000 pounds at point of selection.	Sample number.
Insoluble.	Total.		Present as muriate.	Present as sulphate.	Total.		Found.	Guaranteed.			
	Found.	Guaranteed.			Found.	Guaranteed.					
.98	9.55	-----	4.91	-----	4.91	4.00	.87	.82	22.69	{ 120.00	265
1.64	9.18	-----	1.60	3.99	5.59	5.00	1.65	1.65	27.25	{ 20.00	617
.94	11.38	-----	1.60	4.26	5.86	6.00	*2.00	2.47	31.84	{ 123.50	83
1.02	8.36	-----	1.63	-----	1.63	1.00	*.71	.82	17.42	{ 24.00	263
1.29	8.02	-----	2.00	7.94	9.94	10.00	2.46	2.47	35.25	{ 27.00	904
										{ 15.00	618
										{ 17.00	905
										{ 31.00	267
2.61	10.07	9.00	2.92	-----	2.92	2.00	1.95	1.65	28.68	{ 124.00	278
										{ 23.00	476
1.70	10.16	9.00	3.52	-----	3.52	3.00	*2.25	2.50	28.26	{ 35.00	316
										{ 128.00	279
1.85	9.80	9.00	3.90	-----	3.90	9.00	1.05	.85	27.28	{ 26.00	1219
2.71	11.71	8.00	5.20	-----	*5.20	6.00	*1.42	2.06	26.90	{ 24.00	433
2.12	10.26	9.00	1.73	8.37	10.10	10.00	1.70	1.65	33.69	{ 130.00	311
										{ 26.00	721
2.31	9.93	7.50	5.58	-----	5.58	4.50	1.59	1.65	26.65	{ 30.00	1077
2.04	11.27	9.00	3.02	-----	3.02	3.00	.55	.41	20.52	{ 25.00	277
										{ 128.00	748
										{ 23.00	315
										{ 118.00	1056
										{ 17.25	723
											793
1.77	*8.16	9.00	6.47	-----	*6.47	8.00	*.71	.82	21.70	27.00	169
1.50	*9.56	11.00	3.28	-----	3.28	2.00	.89	.82	21.02	21.00	170
1.43	*9.99	11.00	3.14	-----	3.14	2.00	.64	.41	20.16	17.00	171
1.47	10.05	9.00	6.49	-----	6.49	6.00	*2.21	2.47	31.06	28.00	45
1.44	9.54	9.00	4.57	-----	4.57	4.00	1.00	.82	22.81	24.00	281
										{ 122.00	179
										{ 26.00	492
1.47	9.71	9.00	2.40	-----	2.40	2.00	.91	.82	20.28	{ 21.00	151
										{ 21.00	46
1.43	9.51	9.00	7.42	-----	7.42	7.00	*3.08	3.29	35.53	{ 36.00	187
1.34	10.07	9.00	6.44	-----	6.44	6.00	*2.25	2.47	31.28	{ 30.00	551
1.15	9.57	9.00	1.43	-----	1.43	1.00	.95	.82	19.56	{ 21.00	157
										{ 125.00	282
										{ 18.75	140
											210
											1863
*8.88	12.82	-----	5.39	-----	5.39	5.00	*2.55	3.30	30.48	60.00	255

*Constituent falls below guaranty.

**Guaranteed 12 per cent. insoluble phosphoric acid.

COMPLETE FERTI

Sample number.	Manufacturer and Brand.	From Whom Sample Was Taken.	Moisture in 100 pounds.	Phosphoric	
				Available.	
				Found.	Guaranteed.
HUBBARD FERTILIZER CO., THE, BALTIMORE, MD.					
106		Biglerville Warehouse Co., Biglerville.			
31	Hubbard's Climax Phosphate, -----	H. M. Owens Co., Lewisburg, Wesley Seltzer, Schuylkill Haven.	6.34	6.94	7.00
292		Biglerville Warehouse Co., Biglerville.			
107		H. M. Owens & Co., Lewis-town.	6.98	8.36	8.00
30	Hubbard's Columbia Gem, -----	J. A. Romberger, Elizabethville.			
610		J. A. Umble & Bro., Bird-in-Hand.	9.18	*7.58	8.00
1720	Hubbard's Farmers I. X. L., -----	W. A. Esenwine, Salona, R. D. No. 1.			
164		H. M. Owens & Co., Lewis-town.	9.39	8.28	8.00
32	Hubbard's Jersey Trucker, -----	Z. B. Spera, Dillsburg, -----			
1158		J. M. Smith, Jefferson, -----	8.21	7.92	8.00
1617	Hubbard's Royal Ensign, -----	Win. Thompson, Jr., Lemont,	8.74	8.11	8.00
1428	Hubbard's Standard Phosphate, -----				
JARECKI CHEMICAL CO., THE, SANDUSKY, OHIO.					
360	Fish Phosphate & Potash and Tobacco & Potato Food.	G. L. Rommell, Mt. Air, -----	12.64	9.16	8.00
215		S. P. Manch, Ten Mile Bot- tom.	12.52	8.74	8.00
576	Lake Erie Guano with Phosphate and Potash.	W. H. Stephenson, Volant, -----			
575	No. 1 Formula, -----	W. H. Stephenson, Volant, -----	11.11	9.12	8.00
213	Tobacco and Truck Grower, -----	S. P. Manch, Ten Mile Bot- tom.	10.87	7.10	6.00
T. S. KENDERDINE & SONS, NEW-TOWN, PA.					
1102	Kenderdine's Potato Phosphate, -----	T. S. Kenderdine & Son, New-town.	8.92	7.96	7.00
KEYSTONE BONE FERTILIZER CO., THE, PHILADELPHIA, PA.					
970		E. A. Slagle, Paxinos, -----			
303	Keystone 20th Century Special, -----	C. H. Schoffstall, Valley View	12.51	6.47	5.00
1317		C. E. Rauscher, Blossburg, -----			
2	Keystone Economy Potash Compound	Geo. Krause, Rock, -----	10.08	8.24	7.00
1350		Daniel F. Knittle, Catawissa, R. D. 1.			
304	Keystone Grain and Grass Manure, -----	C. H. Schoffstall, Valley View	10.27	7.26	7.00
1749		L. A. Geiger, Joanna, -----			
1840	Keystone High Grade Truck and Tobacco Guano.	John Kuntz, Tripoli, -----	12.35	6.13	6.00
811	Keystone Supreme Potato and Truck Manure.	W. H. Miller, Northumberland R. D. 1.	9.72	7.85	8.00
1808	Keystone Standard Potato Manure, -----	John Hape, Conyngham, -----	11.70	6.34	6.00
1839	Keystone Vegetable Guano, -----	John Kuntz, Tripoli, -----	11.82	7.55	6.00
LANCASTER BONE FERTILIZER CO., LANCASTER, PA.					
1484	Complete Ammoniated Bone Manure,-----	Josiah Flinchbaugh, Windsorville.	14.00	*7.38	8.00

†Composite sample.

LIZERS—Continued.

Acid in 100 Pounds.			Potash in 100 Pounds.				Nitrogen. in 100 lbs.		Computed commercial value of 2,000 pounds at Department rating.	Selling price of 2,000 pounds at point of selection.	Sample number.
Insoluble.	Total.		Present as muriate.	Present as sulphate.	Total.		Found.	Guaranteed.			
	Found.	Guaranteed.			Found.	Guaranteed.					
.94	*7.88	8.75	4.81	-----	4.81	4.00	1.01	.82	21.64	20.00	106
										†21.00	31
										17.35	232
										17.00	107
1.76	10.12	9.75	2.66	-----	2.66	2.00	.45	.41	15.91	†18.00	30
1.66	*9.24	9.75	2.42	-----	2.42	2.00	1.45	1.64	22.35	16.00	610
										22.00	1723
.96	*9.24	10.00	10.08	-----	10.08	10.00	1.49	1.64	30.84	30.00	164
										†30.00	32
1.78	*9.70	10.00	6.72	-----	6.72	4.00	1.90	2.46	29.29	30.00	1158
1.02	*9.18	10.00	3.36	-----	3.36	3.00	1.63	1.64	24.49	25.00	1617
										-----	1428
.88	9.54	9.00	3.50	-----	*3.50	4.00	.93	.83	22.06	22.00	360
1.11	9.85	9.00	2.40	-----	2.40	2.50	1.14	1.25	21.82	†26.00	215
.47	9.59	9.00	2.12	-----	2.12	2.00	.80	.83	19.94	-----	576
.10	7.20	7.00	5.69	-----	*5.69	6.00	1.69	1.66	25.68	30.00	575
											213
1.40	9.26	9.00	9.77	-----	*9.77	10.00	1.59	1.65	30.81	30.00	1102
.79	7.26	6.00	10.82	-----	10.82	10.00	1.22	1.24	23.14	26.00	970
										†26.00	308
1.16	9.40	9.00	5.80	-----	5.80	5.00	.90	.82	23.60	26.00	1817
										21.50	2
										19.00	1350
.92	8.18	8.00	1.86	-----	1.86	1.00	.94	.82	18.69	18.00	304
										-----	1749
1.23	7.36	7.00	2.68	-----	2.68	2.00	3.88	3.30	32.73	27.00	1840
1.15	9.00	9.00	9.03	-----	9.03	7.00	3.85	3.30	40.66	34.00	811
1.05	7.39	7.00	7.20	2.06	*9.25	10.00	*2.26	2.47	31.99	30.00	1806
.85	8.40	7.00	6.75	-----	6.75	6.00	1.65	1.66	27.32	24.00	1839
1.89	9.27	9.00	2.37	-----	2.37	2.00	.90	.82	19.53	22.00	1434

*Constituent falls below guaranty.

COMPLETE FERTI

Sample number.	Manufacturer and Brand.	From Whom Sample Was Taken.	Moisture in 100 pounds.	Phosphoric	
				Available.	
				Found.	Guaranteed.
1898	{Potato, Fruit and Vegetable, -----	Dr. J. Bumford, Wilmore, ---	10.24	7.85	7.00
1894		P. F. Wasson, Lovejoy, ---			
1499		M. E. Rittenhouse, Berwick, ---			
1896	{Potato, Tobacco and Truck Manure, -----	R. D. 2. P. F. Wasson, Lovejoy, ---	8.02	8.32	8.00
LANCASTER CHEMICAL CO., THE, LANCASTER, PA.					
724	No. 1 Tobacco and Vegetable Fertilizer, -----	E. B. Ruhl & Son, Manheim, ---	8.73	8.35	7.50
708		J. B. Myer, Leola, -----	7.77	*6.19	8.00
707	No. 4 Rising Sun Animal Bone, -----	J. B. Myer, Leola, -----	6.31	10.50	10.00
DANIEL LEVAN, LEBANON, PA.					
1078	{Levan's Special Truck Fertilizer, ---	Dessinger & Leasher, Campbelltown.	8.58	8.16	7.00
11		A. J. Fidler Sec, Paradise, ---			
1539		E. H. Meyer, Annville, -----			
248	Levan's Wheat and Grass Special Fertilizer.	Wm. G. Stricker, Dauphin, ---	6.13	8.58	8.00
LISTER AGRICULTURAL CHEMICAL WORKS, NEWARK, N. J.					
420	{Lister's Corn an Potato Fertilizer, ---	J. H. Hortman, Hop Bot- tom.	11.69	8.04	8.00
146		Knecht Bros., Parvin, -----			
539		D. B. Griffith, Wolfsburg, R. D.			
352	{Lister's Harvest Queen Phosphate, ---	D. E. Gamble, Monongahela, Clark Bros., Oil City, -----	11.76	9.15	9.00
211		H. Y. Pickering, Yardley, ---			
1028		Jacob M. Zook, Belleville, ---			
640	{Lister's Potato and Corn No. 2 Fer- tilizer.	D. E. Gamble, Monongahela, B. Savage, Turbotville, -----	12.00	10.29	10.00
351		W. E. Erwin, Somerton, -----			
808		R. D. Sames, Coopersburg, ---			
627	{Lister's Potato Manure, -----	W. H. Schriver, Dillsburg, H. J. Pickering, Yardley, ---	9.80	8.27	8.00
497		Sylvester Gair, Easton, -----			
1156		Miller & Enrich, Mechanics- burg.			
641	{Lister's Special 10 Per Cent. Potato Fertilizer.	Grove & Uffelman, Brogueville Station.	11.97	8.43	8.00
233		H. H. Dietrich, West Willow, Sylvester Gair, Easton, -----			
1002		Knecht Bros., Parvin, -----			
1443	Lister's Special Fertilizer for Tomatoes, -----	D. E. Gamble, Monongahela, H. M. Gordy, Stonington, ---	8.02	*6.77	7.00
735	{Lister's Special Crop Producer, -----	Charles Beckman, Fairview, ---	12.05	9.41	9.00
234		Sylvester Gair, Easton, -----			
145		B. Savage, Turbotville, -----			
353	{Lister's Success Fertilizer, -----	W. & G. Mitchell, Milford, ---	10.60	6.01	6.00
909		Wm. J. Hess, Quarryville, ---			
1401		Secrist & Thrig, York, -----			
221	Lister's 3-6-10 for Potatoes, -----		9.75	8.09	8.00
809	{Lister's U. S. Super Phosphate, -----				
1091	FREDERICK LUDLAM CO., BALTI- MORE, MD.				
744	Ludlam's Oecrops Fertilizer No. 2 for Grain and Grass.	Wm. J. Hess, Quarryville, ---	11.19	7.39	7.00
1212	Ludlam's Oecrops Fertilizer O. & G. Brand.	Secrist & Thrig, York, -----	8.23	8.89	8.00

†Composite sample.

LIZERS—Continued.

Acid in 100 Pounds.			Potash in 100 Pounds.				Nitrogen. in 100 lbs.		Computed commercial value of 2,000 pounds at Department rating.	Selling price of 2,000 pounds at point of selection.	Sample number.
Insoluble.	Total.		Present as muriate.	Present as sulphate.	Total.		Found.	Guaranteed.			
	Found.	Guaranteed.			Found.	Guaranteed.					
1.57	9.42	8.00	6.17	-----	*6.17	7.00	.91	.82	23.74	{ 124.00 24.00	1808 1804
2.41	10.78	9.00	7.01	-----	*7.01	8.00	1.58	1.65	28.89	{ 124.00 28.00	1470 1836
1.01	9.86	8.50	1.49	4.62	*6.11	7.00	1.92	2.06	29.57	30.00	724
.88	*7.02	9.00	5.77	-----	5.77	4.00	1.32	1.24	23.04	22.50	705
1.68	12.18	11.00	.83	8.87	*4.00	2.00	*1.26	2.47	26.67	26.50	767
										28.00	1078
.96	9.09	8.00	10.29	-----	10.29	10.00	*1.45	1.65	30.44	{ 124.50 -----	11 1538
1.17	9.75	9.00	2.57	-----	*2.57	5.00	.85	.82	30.41	20.00	248
										27.00	420
1.93	9.97	9.00	3.47	-----	3.47	3.00	1.75	1.65	25.44	{ 125.50 23.50 27.00	146 539 352
1.56	10.71	10.00	2.36	-----	2.36	2.00	1.34	1.23	23.86	{ 126.00 22.00 27.00	211 1028 940
1.95	12.24	11.00	4.47	-----	4.47	4.00	1.65	1.65	28.30	{ 130.00 22.00 33.00	351 808 627
1.44	9.71	9.00	7.46	-----	7.46	7.00	3.36	3.29	37.70	{ 136.00 35.00 32.00	497 1156 641
2.18	9.88	9.00	10.15	-----	10.15	10.00	1.91	1.65	32.79	{ 130.00 31.00 20.00	233 1062 1443
1.28	9.71	9.00	2.47	-----	2.47	2.00	1.70	1.65	24.30	-----	
1.21	9.66	9.00	3.09	-----	3.09	3.00	*1.78	2.06	25.40	-----	735
2.01	8.78	8.00	1.46	-----	1.46	1.00	1.00	.82	18.57	{ 17.50 120.50 25.00	234 145 353
1.78	11.19	10.00	2.33	-----	2.33	2.00	1.30	1.23	23.49	{ 121.00 23.00	969 1401
1.89	7.90	7.00	10.14	-----	10.14	10.00	2.42	2.47	33.30	28.50	221
1.84	9.98	9.00	2.18	-----	2.18	2.00	.97	1.03	20.36	{ 120.00 28.00	809 1691
2.52	9.91	8.00	1.27	-----	1.27	1.00	.79	.82	18.26	18.00	741
.96	9.85	9.00	2.37	-----	2.37	2.00	.50	.41	18.74	16.75	1212

*Constituent falls below guaranty.

COMPLETE FERTI

Sample number.	Manufacturer and Brand,	From Whom Sample Was Taken.	Moisture in 100 pounds.	Phosphoric	
				Available.	
				Found.	Guaranteed.
1210	†Ludham's Cecrops Fertilizers, Harvest Queen.	Secrist & Thrig, York, -----	9.49	8.63	8.00
1587	†Ludham's Cecrops Fertilizers, Standard Potash.	Peter Zerfing, New Boomfield, -----	10.90	8.58	8.00
264		Chas. O. Knauss, Halifax, -----			
1213		Secrist & Thrig, York, -----			
1087		O. C. & E. G. Tritt, Centerville, -----			
745	†Ludham's Cecrops Fertilizers, Spring Special.	Wm. J. Hess, Quarryville, -----	8.66	9.32	9.00
1211		Secrist & Thrig, York, -----			
MAPES FORMULA & PERUVIAN GUANO CO., NEW YORK, N. Y.					
273	†Mapes Average Soil Complete Manure	W. H. Muth & Co., Lititz, -----	9.11	7.05	7.00
812		W. H. Diehl, Northumberland, R. D. 1. -----			
666	Mapes Cereal Brand, -----	A. J. Wolf, East Stroudsburg, -----	8.03	*5.17	6.00
664		A. J. Wolf, East Stroudsburg, -----			
636	†Mapes Complete Manure, A Brand, -----	John B. Satterthwaite, Woodbourne, -----	9.14	*8.70	10.00
1064		E. W. Rupp, Shiremanstown, -----			
1830	Mapes Complete Manure, 10 Per Cent. Potash.	G. O. Fenstenmacher, North Penn. -----	8.59	5.30	3.00
665		A. J. Wolf, E. Stroudsburg, -----			
635	†Mapes Corn Manure, -----	J. B. Satterthwaite, Woodbourne, -----	7.72	*7.08	8.00
1828		G. O. Fenstenmacher, North Penn. -----			
637		J. B. Satterthwaite, Woodbourne, -----			
270	†Mapes Economical Potato Manure, -----	W. H. Muth & Co., Lititz, -----	5.43	5.37	4.00
659		A. J. Wolf, East Stroudsburg, -----			
208	†Mapes General Crop Brand, -----	W. H. Muth & Co., Lititz, -----	11.10	8.08	8.00
658		A. J. Wolf, E. Stroudsburg, -----			
1001	Mapes Grain Brand, -----	Geo. Schoch, Selinsgrove, -----	6.83	8.09	8.00
1002		Geo. Schoch, Selinsgrove, -----			
663	†Mapes Potato Manure, -----	A. J. Wolf, E. Stroudsburg, -----	8.32	7.85	8.00
1253		A. F. Kimmel, Orwigsburg, -----			
271	Mapes Tobacco Manure Wrapper Brand	W. H. Muth, Lititz, -----	7.33	3.40	-----
209	Mapes Tobacco Starter Improved, -----	W. H. Muth, Lititz, -----	8.75	*5.18	6.00
272	Mapes Top Dresser Improved, Half Strength.	W. H. Muth, Lititz, -----	8.42	*2.16	2.50
15	Mapes Top Dresser Improved, Full Strength.	M. H. Boyer, Pine Grove, -----	6.29	5.71	5.00
1829	Mapes Vegetable or Complete Manure for Light Soil.	G. O. Fenstenmacher, North Penn. -----	5.48	6.10	6.00
NOAH MARKLE, SEITZLAND, PA.					
1454	Markle A. C. O. Phosphate, -----	D. J. Trout, Stewartstown, -----	9.79	9.03	7.00
1453	Markle Electric Phosphate, -----	D. J. Trout, Stewartstown, -----	9.59	10.00	9.00
1452	Markle Potato Grower, -----	D. J. Trout, Stewartstown, -----	8.41	7.97	7.00
D. B. MARTIN CO., PHILADELPHIA, PA.					
1458	Martin's Bull Head Fertilizer for Cotton and Tobacco.	J. O. Leib & Co., Stewartstown, -----	10.21	8.02	8.00
526		Amandus Wotring, Schnecks-ville, -----			
341	†Martin's Corn and Cereal Special, -----	R. J. Wallace, Canonsburg, -----	12.09	8.63	8.00
725		L. P. White, Manheim, -----			
284	†Martin's Early Truck and Vegetable Grower.	E. K. Brubaker, Lititz, -----	13.75	7.09	6.00
1826		T. S. Balliett, Chain, -----			

LIZERS—Continued.

Acid in 100 Pounds.			Potash in 100 Pounds.				Nitrogen. in 100 lbs.		Computed commercial value of 2,000 pounds at Department rating.	Selling price of 2,000 pounds at point of selection.	Sample number.
Insoluble.	Total.		Present as muriate.	Present as sulphate.	Total.		Found.	Guaranteed.			
	Found.	Guaranteed.			Found.	Guaranteed.					
1.06	9.69	9.00	2.38	-----	2.38	2.00	.90	.82	20.49	{ 118.65 21.00 120.00 20.10 23.00	1210
.96	9.54	9.00	4.07	-----	4.07	4.00	.74	.82	21.36		1567
											264
											1213
1.08	10.40	10.00	9.34	-----	9.34	7.00	.82	.82	28.33	{ 125.00 22.80	745
											1811
1.80	8.85	-----	1.33	4.81	6.14	5.00	*3.90	4.12	38.81	{ 136.00 40.00 32.00 38.00	273
4.38	9.56	8.00	3.88	-----	3.83	3.00	1.75	1.65	24.09		812
											666
											664
4.69	13.39	12.00	2.99	-----	2.99	2.50	2.40	2.47	30.12	{ 137.00	686
1.48	6.68	5.00	1.33	9.57	10.90	10.00	1.90	2.06	32.38	{ 33.00 34.00	1064
											1830
4.27	11.35	10.00	6.66	-----	6.66	6.00	*2.12	2.47	29.58	{ 38.00 137.00 38.00	665
											635
											1828
2.11	7.48	6.00	2.26	6.46	8.72	8.00	3.10	3.29	35.88	{ 38.00	687
2.68	10.76	10.00	2.48	-----	2.48	2.00	1.52	1.65	23.72	{ 39.00 123.00 28.00 24.00	659
2.21	10.90	-----	4.56	-----	4.56	4.00	.86	.82	23.06		268
											658
											1001
2.11	9.96	9.00	2.00	5.06	7.06	6.00	3.65	3.71	39.03	{ 37.00 142.00 40.00	1002
2.38	5.78	4.50	2.13	8.41	10.54	10.50	*5.78	6.18	49.16	{ 48.00 36.00 33.00	669
5.16	10.34	8.00	1.60	.79	2.39	1.00	4.05	4.12	34.21		1253
1.87	4.08	4.00	2.00	.28	2.28	2.00	4.90	4.94	33.45		271
											269
3.15	8.86	8.00	4.52	-----	4.52	4.00	*9.89	9.88	61.45	{ 56.00	15
3.00	9.10	8.00	7.58	-----	7.58	6.00	5.85	4.94	46.52	{ 42.00	1829
.88	9.91	8.00	8.26	-----	8.26	8.00	*1.44	1.65	29.38	{ 25.00 18.00 24.00	1454
1.59	11.59	10.00	2.38	-----	2.38	2.00	.39	.41	19.76		1453
3.82	11.79	8.00	3.97	-----	3.97	4.00	1.62	1.65	26.10		1452
.64	8.66	-----	3.84	-----	3.84	3.00	2.96	2.47	30.96	{ 25.00	1458
1.85	10.48	-----	2.65	-----	2.65	2.00	1.51	1.65	24.01	{ 21.00 124.00 22.00 130.00 30.25	523
.56	7.64	-----	8.51	-----	8.51	8.00	3.13	3.30	35.71		841
											725
											284
											1826

*Constituent falls below guaranty.

COMPLETE FERTI

Sample number.	Manufacturer and Brand.	From Whom Sample Was Taken.	Moisture in 100 pounds.	Phosphoric	
				Available.	
				Pound.	Guaranteed.
1327	Martin's Gilt Edge Potato Manure, ---	T. S. Balliett, Chain, -----	11.00	8.49	7.00
448	†Martin's One, Eight and Four, -----	Sam. K. Strickler, Mifflinburg, ---	11.06	*7.75	8.00
340		R. J. Wallace, Canonsburg, ---			
558		R. W. Clark & Son, -----			
650	†Martin's Prize Potato, -----	E. J. Houck, Bangor, -----	10.63	8.31	8.00
525		Amandus Wotring, Schnecks- ville, -----			
730		L. P. White, Manheim, -----			
1463	Martin's Pure Animal Bone and Potash	H. W. Reheymer, Turnpike, ---	6.72	5.33	-----
729	†Martin's Special Compound, -----	L. P. White, Manheim, -----	12.37	7.98	8.00
1291		Mars Milling & Feed Co., --- Mars, -----			
1192	Martin's Special Mixture, -----	A. P. Lippy, Littlestown, -----	10.07	*6.58	8.00
651	†Martin's Special Potato Manure, ---	E. J. Houck, Bangor, -----	15.20	9.03	8.00
339		R. J. Wallace, Canonsburg, ---			
727		L. P. White, Manheim, -----			
527	†Martin's Sure Grower, -----	Amandus Wotring, Schnecks- ville, -----	12.06	7.95	8.00
384		E. J. Houck, Bangor, -----			
723		L. P. White, Manheim, -----			
FREDERICK MEHRING, BRUCE- VILLE, MD.					
1186	General Crop Grower, -----	J. N. Siffer, Littlestown, -----	12.18	14.30	10.00
1185	Twenty Six Dollar Phosphate, -----	J. N. Siffer, Littlestown, -----	11.74	13.23	10.00
MILLER FERTILIZER CO., THE, BALTIMORE, MD.					
276	†Harvest Queen, -----	W. H. Muth, Litz, -----	8.50	9.19	9.00
111		Biglerville Warehouse Co., Big- lerville, -----			
1091	†Potato and Vegetable Grower, -----	F. A. Bidan, Titusville, -----	8.25	8.11	8.00
1963					
1450	Special Tobacco Grower, -----	J. W. Keesey, Stewartstown, ---	8.66	8.00	8.00
152	†Special Potato Fertilizer, -----	W. L. Wolf, Boonerville, -----	6.41	7.52	7.00
81		H. E. Riddlemoser, McKnight- town, -----			
815		J. A. Gass, Sunbury, -----			
439	†Hustler Phosphate, -----	Peter Hause, New Columbia, ---	8.50	8.02	8.00
110		Biglerville Warehouse Co., Big- lerville, -----			
1546		Saul Baeshore, Fredericks- burg, -----			
80	†Pimlico, -----	H. E. Riddlemoser, McKnight- town, -----	7.43	8.08	8.00
597		G. H. Anderson, Muncy, R. --- D. 7, -----			
320	W. G. Phosphate, -----	A. R. Gilmore, Linden, -----	8.06	7.26	7.00
NASSAU FERTILIZER CO., NEW YORK, N. Y.					
879	†Common Sense Potato Manure, -----	O. L. Allen, Powell, -----	11.15	8.75	8.00
70		Mat. Griffith, St. Joseph, -----			
1380		D. J. Davis, Ebensburg, -----			

†Composite sample.

LIZERS—Continued.

Acid in 100 Pounds.			Potash in 100 Pounds.						Computed commercial value of 2,000 pounds at Department rating.	Selling price of 2,000 pounds at point of selection.	Sample number.
Insoluble.	Total.		Present as muriate.	Present as sulphate.	Total.		Found.	Guaranteed.			
	Found.	Guaranteed.			Found.	Guaranteed.					
.51	9.00	-----	10.08	-----	10.08	10.00	*2.22	2.47	34.42	30.00	1327
1.47	9.22	-----	5.27	-----	5.27	4.00	.87	.82	22.44	16.98	448
										123.00	340
										23.50	553
										22.00	650
1.30	9.61	-----	9.53	-----	*9.53	10.00	1.08	1.65	31.40	137.50	535
										28.00	730
13.51	19.34	16.00	3.51	-----	3.51	2.50	*1.41	1.65	27.14	25.00	1463
1.53	9.51	-----	3.69	-----	*3.69	5.00	1.77	1.65	25.48	123.00	723
										20.00	1291
2.72	9.30	-----	4.14	-----	4.14	3.00	.35	.41	13.34	18.00	1192
										28.00	631
.96	9.99	-----	5.25	-----	5.25	5.00	.83	.82	23.52	124.00	333
										20.00	727
1.20	9.15	-----	1.65	-----	1.65	1.00	.89	.82	19.09	18.00	527
										118.00	384
										17.00	728
.91	15.30	11.00	2.04	-----	2.04	1.50	*.71	.82	25.48	17.00	1186
3.61	16.84	11.00	1.86	-----	1.86	1.50	1.56	1.24	28.98	19.00	1185
.75	9.94	9.50	3.31	-----	3.31	2.75	1.13	1.03	23.28	21.00	276
										121.00	111
1.03	9.14	8.50	4.37	-----	4.37	4.00	1.39	1.65	27.30	25.00	1091
										-----	1903
1.23	9.23	8.50	4.33	-----	4.33	4.00	1.55	1.65	25.06	23.50	1450
.77	8.29	7.50	5.31	-----	5.31	5.00	.98	.83	22.65	22.25	153
										121.00	81
										25.00	81
										19.00	463
1.15	9.17	8.50	1.89	-----	1.89	1.00	.82	.83	13.92	118.00	110
										20.00	1546
.99	9.02	8.50	10.63	-----	10.63	10.00	1.63	1.65	31.37	123.00	81
1.17	8.43	7.50	1.36	-----	1.36	1.00	.47	.42	15.94	28.00	597
										20.00	321
1.03	9.73	9.00	4.11	-----	4.11	4.00	1.66	1.65	25.94	26.00	879
										127.50	70
										26.00	1880

*Constituent falls below guaranty.

COMPLETE FERTI

Sample number.	Manufacturer and Brand.	From Whom Sample Was Taken.	Phosphoric		
			Available.		
			Moisture in 100 pounds.	Pound.	Guaranteed.
456		J. L. Sanders, Mifflinburg, ...			
387	†General Favortie, -----	J. T. Foulk & Co., Houtzdale.	8.74	8.35	8.00
1216		Brillinger & Swartz, Emigsville.			
865	Gladiator Truck and Potato, -----	F. L. Thompson, Schulzville, ...	11.62	7.49	7.00
458	Old Hickory, -----	A. R. Walters, Swengle, ...	9.28	10.36	10.00
386		J. T. Foulk & Co., Houtzdale.			
71	†Special Potato Fertilizer, -----	Mat. Griffith, St. Joseph, ...	10.20	8.51	8.00
459		A. R. Walters, Swengle, ...			
1061		J. H. Kooler, Mechanicsburg, ...			
388	†Wheat and Grass Grower, -----	J. T. Foulk & Co., Houtzdale.	10.87	9.18	8.00
1215		Brillinger & Swartz, Emigsville.			
	G. OBER & SONS CO., BALTIMORE, MD.				
95	Ober's Special Plant Food, -----	D. Blocher & Co., Gettysburg, ...	8.96	9.43	9.00
	OXFORD PACKING WORKS, OXFORD, PA.				
172	†Grange Two, -----	Oxford Packing Works, Kelton	14.10	8.64	8.00
1688		Oxford Packing Works, Nottingham.			
	OYLER & SPANGLER, GETTYSBURG, PA.				
97	Acidless, -----	M. S. Orner, Gettysburg, ...	6.76	*4.62	7.00
	PATAPSCO GUANO CO., BALTIMORE, MD.				
261	Columbian Guano for Truck, Potatoes and Tobacco, -----	J. O. S. Berkholder, Hummelstown.	9.12	8.58	8.00
263	Coon Brand Guano, -----	J. O. S. Berkholder, Hummelstown.	11.43	9.91	9.00
1431	Grange Mixture, -----	Jonathan Geesey & Son, Daltown.	12.50	8.43	8.00
455		J. R. Iddings, Vicksburg, ...			
89	†Patapasco B. B. & P. Brand, -----	E. C. Thomas, Gettysburg, ...	9.36	7.90	8.00
1568		Jacob Fritz, New Bloomfield, ...			
282	†Patapasco Corn and Tomato Fertilizer	J. O. S. Berkholder, Hummelstown.	12.36	9.24	9.00
347		Russell Bros., Washington, ...			
810		Walter & Fredericks, Milton, ...			
260	†Patapasco Early Trucker for Quick Growth.	R. D. S.			
1467		J. O. S. Berkholder, Hummelstown.	9.84	7.45	7.00
90	†Patapasco Grain and Grass Producer,	H. P. Kocher, Wrightsville, ...			
465		E. C. Thomas, Gettysburg, ...	9.55	8.73	8.00
454		Geo. L. Schull, Vicksburg, ...			
346	†Patapasco Potato Manure, -----	J. R. Iddings, Vicksburg, ...			
1569		Russell Bros., Washington, ...	8.74	5.46	5.00
1432	Patapasco Tobacco and Potato Fertilizer.	Jacob Fretz, New Bloomfield, ...	12.27	8.67	8.00
		Jonathan Geesey & Son, Daltown.			
	PENNSYLVANIA AMMONIA AND FERTILIZER WORKS, HARRISBURG, PA.				
246	Capital Brand, -----	A. H. Carlisle, Coxestown, ...	8.69	9.44	9.00
1063	Dauphin Brand, -----	E. W. Rupp, Shiremanstown, ...	9.73	*9.73	10.00
245	†Potato, Vegetable and Tobacco Fertilizer.	A. H. Carlisle, Coxestown, ...	6.08	8.28	8.00
250		M. D. Ebersole, Middletown, ...			

†Composite sample.

LIZERS—Continued.

Acid in 100 Pounds.			Potash in 100 Pounds.				Nitrogen. in 100 lbs.		Computed commercial value of 2,000 pounds at Department rating.	Selling price of 2,000 pounds at point of selection.	Sample number.
Insoluble.	Total.		Present as muriate.	Present as sulphate.	Total.		Found.	Guaranteed.			
	Found.	Guaranteed.			Found.	Guaranteed.					
1.12	9.47	9.00	4.25	-----	4.25	4.00	.86	.82	21.86	21.00	456
										129.00	387
1.34	8.83	8.00	7.63	-----	7.63	7.00	*3.06	3.29	35.14	20.00	1216
1.17	11.53	11.00	7.21	-----	*7.21	8.00	.78	.82	26.74	33.00	865
										25.50	458
										36.00	386
1.06	9.57	9.00	9.79	-----	*9.79	10.00	2.08	1.65	33.66	130.00	71
										29.00	459
										18.50	1061
.85	10.08	9.00	2.52	-----	2.52	2.00	1.00	.82	21.56	126.50	383
										18.00	1215
1.25	10.68	10.00	3.79	-----	*3.79	5.00	*1.34	1.65	24.99	25.00	95
.75	*9.39	10.00	7.77	-----	7.77	6.00	1.61	1.44	29.17	124.00	173
										25.00	1698
2.62	*7.24	9.00	9.44	-----	9.44	8.00	*1.92	2.47	29.14	30.00	97
1.17	9.70	9.00	5.73	-----	5.73	5.00	2.47	2.47	31.30	30.00	261
.61	10.52	10.00	3.06	-----	3.06	3.00	.90	.82	22.22	20.00	263
1.13	9.56	9.00	2.05	-----	2.05	2.00	1.58	1.65	23.29	22.00	1431
.96	8.86	9.00	2.64	-----	2.64	2.00	.44	.41	17.78	16.50	455
										116.50	8)
										18.00	1568
1.15	10.39	10.00	2.17	-----	2.17	2.00	1.16	1.23	22.10	122.00	262
										27.50	347
										34.00	810
1.40	8.85	8.00	6.74	-----	6.74	5.00	*3.66	4.11	37.08	132.00	260
.89	9.62	9.00	3.97	-----	3.97	4.00	.90	.82	22.11	34.00	1467
										120.00	90
.91	6.37	6.00	9.64	-----	*9.64	10.00	1.65	1.65	28.15	20.00	466
										27.00	454
1.22	9.89	9.00	3.97	-----	3.97	4.00	1.65	1.65	25.81	130.00	346
										30.00	1569
										23.50	1432
1.02	*10.46	11.00	3.86	-----	3.86	4.00	*1.39	1.65	25.16	28.00	246
.78	*10.51	11.50	2.96	-----	2.96	2.00	1.06	1.23	22.74	21.00	1068
1.13	*9.41	10.00	.67	8.04	*8.71	9.00	*2.17	2.47	33.56	132.00	245
										32.00	250

*Constituent falls below guaranty.

COMPLETE FERTI

Sample number.	Manufacturer and Brand.	From Whom Sample Was Taken.	Moisture in 100 pounds.	Phosphoric	
				Available.	
				Found.	Guaranteed.
PENNSYLVANIA FERTILIZER CO., THE, BUFFALO, N. Y.					
1381	Big Bonanza, ...	M. F. Bailey, Willsboro, ...	12.93	9.31	8.00
1382	Empire 10 Per Cent., ...	M. F. Bailey, Willsboro, ...	10.91	7.93	8.00
1379	Four Fold, ...	M. F. Bailey, Willsboro, ...	15.27	10.52	8.01
1380	Vegetable and Vine, ...	M. F. Bailey, Willsboro, ...	10.74	*8.94	10.00
J. D. PERKINS, COATESVILLE, PA.					
175	Perkins' Monarch Phosphate, ...	Edw. Tringley, Kelton, ...	11.85	10.60	8.00
174	Perkins' Special Bono Manure, ...	Edw. Tringley, Kelton, ...	13.06	8.55	8.00
PIEDMONT MT. AIRY GUANO CO., BALTIMORE, MD.					
588	†Insula Guano, ...	M. Gillis, Hughesville, ...	5.37	6.87	7.00
1567		A. H. Ulah, Millerstown, ...			
1486		O. F. Fredericks, Mercersburg, ...			
965	†Piedmont Penna. Grain Grower, ...	J. G. Simpson, Huntingdon, ...	5.03	6.22	7.00
1797		P. Wrigley Hardware Co., Mahaffey, ...			
587		M. Gillis, Hughesville, ...			
119	†Piedmont Pennsylvania Potato Producer, ...	Aspers Milling & Produce Co., Aspers, ...	6.89	7.75	6.00
1080		Robt. T. Close, Milroy, ...			
589	†Piedmont Perfection Guano, ...	M. Gillis, Hughesville, ...	7.17	9.07	8.00
1445		O. L. Grove, Kelton, ...			
958	Piedmont Pure Raw Bone Mixture, ...	J. G. Simpson, Huntingdon, ...	5.98	8.41	8.00
98	Piedmont Royal Ammoniated Bone and Potash, ...	H. D. & Z. F. Bream, Gettysburg, ...	7.18	8.16	6.00
PITTSBURG PROVISION & PACKING CO., PITTSBURG, PA.					
854		G. E. Towns, Pennfield, ...			
843	†Corn and Potato Fertilizer, ...	Dunlap Bros., Canonsburg, ...	7.08	*7.81	9.00
1278		Seoble Parker Co., Pittsburg, ...			
1284	Keystone Fertilizer, ...	F. Gasiti, Wilkinsburg, ...	7.46	9.50	9.00
1277	Lawn Fertilizer, ...	Seoble Parker Co., Pittsburg, ...	5.31	6.42	4.00
1293		C. Beckert & Co., Pittsburg, ...			
349	†Special Potato Fertilizer, ...	Geo. B. Sproul, Claysville, ...	7.64	*8.84	9.00
1611		Weddle & Sutton, West Newton, ...			
POLLOCK FERTILIZER CO., THE, BALTIMORE, MD., BY A. A. O. CO., N. Y.					
1043	†Pollock's Ammoniated Super Phosphate, ...	J. D. Garman, Shippensburg, ...	14.43	8.34	8.00
1768		J. H. Scott, Petersburg, ...			
529	†Pollock's Crop Invigorator, ...	D. W. Dibert, Bedford, ...	10.40	8.31	8.00
881		Francis Baker, Everett, ...			
536	†Pollock's Special Potato and Tobacco Fertilizer, ...	J. L. Longenecker, Woodburg, ...	11.58	8.12	8.00
1208		Strayer Bros., West York, ...			
944	†Pollock's Superior Corn and Tomato Fertilizer, ...	H. A. Starr, Orbslonia, ...	14.64	8.60	8.00
1433		Samuel A. Barahinger, Red Lion, ...			
RAMSBURG FERTILIZER CO., FREDERICK, MD.					
1188	Ramsburg Ammoniated Phosphate, ...	Nelson Study, Littlestown, ...	11.36	*9.04	10.00
1046	†Ramsburg Old Virginia Compound, ...	J. D. Garman, Shippensburg, ...	10.74	8.92	8.00
1189		Nelson Study, Littlestown, ...			
1190	Ramsburg Queen, ...	Nelson Study, Littlestown, ...	13.62	12.62	8.00

†Composite sample.

LIZERS—Continued.

Acid in 100 Pounds.			Potash in 100 Pounds.				Nitrogen. in 100 lbs.		Computed commercial value of 2,000 pounds at Department rating.	Selling price of 2,000 pounds at point of selection.	Sample number.
Insoluble.	Total.		Present as muriate.	Present as sulphate.	Total.		Found.	Guaranteed.			
	Found.	Guaranteed.			Found.	Guaranteed.					
1.91	11.22	9.00	3.79	-----	*3.79	4.00	.82	.80	22.52	27.00	1381
1.77	9.70	9.00	8.08	-----	*8.08	10.00	1.86	1.60	30.50	32.00	1382
1.40	11.92	9.00	2.95	-----	2.95	2.00	*.57	.80	21.44	25.00	1379
1.29	*10.23	11.00	8.97	-----	8.97	8.00	.92	.80	27.61	28.00	1380
1.47	12.07	-----	5.36	-----	5.36	5.00	1.29	1.23	27.61	27.00	175
1.52	10.07	-----	1.28	-----	1.28	1.00	.93	.82	19.74	22.00	171
.13	7.01	-----	2.94	-----	2.94	2.00	.86	.41	14.10	{ 17.00 16.00 20.00	588 1557 1486
.66	6.88	-----	4.75	-----	*4.75	5.00	*.61	.82	18.81	{ 21.50 24.00	965 1797
.55	8.30	-----	9.56	-----	*9.56	10.00	1.50	1.65	29.31	{ 28.00 28.00	587 119
.92	9.99	-----	5.65	-----	5.65	5.00	1.60	1.65	27.56	{ 27.60 25.00 22.00	1030 580 1445
1.78	10.19	10.00	2.62	-----	2.62	2.00	1.23	1.00	22.48	26.00	958
.89	9.05	-----	3.80	-----	3.80	3.00	*.85	1.07	21.10	21.50	96
2.39	*10.20	11.00	3.68	-----	3.68	3.00	1.67	1.43	25.21	{ 25.00 25.00 23.00	854 343 1278
1.43	10.93	11.00	1.75	-----	1.75	1.50	1.50	1.43	23.78	23.00	1234
9.24	*15.66	16.00	2.67	-----	2.67	1.50	2.86	2.87	31.77	40.00	1277
2.05	10.39	10.00	6.51	-----	*6.51	7.00	1.60	1.64	28.22	{ 23.00 30.00 30.00	1293 349 1611
1.12	9.47	9.00	2.44	-----	2.44	2.00	1.53	1.65	23.38	{ 21.50 20.00 21.00	1043 1763 629
1.07	9.38	9.00	4.29	-----	4.29	4.00	*.72	.82	21.15	22.00	831
1.26	9.38	9.00	4.30	-----	4.30	4.00	1.78	1.65	26.35	22.00	586
.85	9.45	9.00	2.24	-----	2.24	2.00	.77	.82	19.47	{ 22.50 20.00	1208 944 1433
9.11	11.15	-----	2.67	-----	2.67	2.00	1.01	.82	22.14	19.00	1188
1.36	10.32	-----	4.46	-----	4.46	4.00	*.75	1.00	22.32	{ 20.00 17.00	1046 1189 1190
1.47	14.09	-----	1.14	-----	1.14	1.00	.49	.41	21.52		

*Constituent falls below guaranty.

COMPLETE FERTI

Sample number.	Manufacturer and Brand.	From Whom Sample Was Taken.	Moisture in 100 pounds.	Phosphoric	
				Available.	
				Found.	Guaranteed.
RASIN MONUMENTAL CO., BALTI-MORE, MD.					
948 474 1199	†Monumental Potato Manure, -----	J. M. Lutz, Shirleysburg, ----- Adam King, Allenwood, ----- J. D. Markle, Hanover, ----- W. W. Book, Port Royal, ----- Asper Milling & Produce Co., ----- Asper.	8.52	6.71	6.00
47 116	†Rasin's Empire Guano, -----	Asper Milling & Produce Co., ----- Asper.	12.44	8.37	8.00
1753 1197 25	Rasin's General Tobacco Grower, ----- Rasin's Genesee Valley Root Manure, ----- Rasin's I. X. L. Fertilizer, -----	L. A. Gelger, Joanna, ----- J. D. Markle, Hanover, ----- O. B. McCormick, State College, -----	11.17 9.52 13.67	8.83 8.87 8.97	8.00 8.00 9.00
533 44	†Rasin's National Crop Compound, --	H. G. Diehl, Bedford, ----- W. W. Book, Port Royal, ----- H. B. Lowe & Sons, Orangeville, ----- Simon R. Carl, Catawissa, R. D. 2, -----	10.30	8.21	8.00
1508 983	†Rasin's Royal Fish Bone and Potash, -----	E. H. Keen & Co., Parkersburg, ----- Wm. Davis, Jr., Greensboro, ----- E. H. Huston, Saltillo, ----- Adam King, Allenwood, ----- H. D. Miller, Mifflinville, ----- A. D. Kramer, Kramer, ----- H. G. Bean, Big Run, ----- W. W. Book, Port Royal, ----- Simon R. Carl, Catawissa, R. D. 2, -----	11.08	7.92	8.00
186 1613	†Rasin's United Grain Grower, -----	Wm. Davis, Jr., Greensboro, ----- E. H. Huston, Saltillo, ----- Adam King, Allenwood, ----- H. D. Miller, Mifflinville, ----- A. D. Kramer, Kramer, ----- H. G. Bean, Big Run, ----- W. W. Book, Port Royal, ----- Simon R. Carl, Catawissa, R. D. 2, -----	11.25	8.22	8.00
839 475 1361 1007 695 43	Rasin's Vegetable Special, ----- †Rasin's Wheat Corn and Oats Mixture -----	H. D. Miller, Mifflinville, ----- A. D. Kramer, Kramer, ----- H. G. Bean, Big Run, ----- W. W. Book, Port Royal, ----- Simon R. Carl, Catawissa, R. D. 2, -----	7.97	8.98	8.00
982	†Rasin's X. X. X. Fertilizer, -----	H. G. Diehl, Bedford, ----- A. C. Richards & Son, Schuylsburg, ----- S. O. Walker, Chadds Ford Junc. ----- Isaac Shivery, McClure, ----- H. A. Snyder, Strawberry Ridge, -----	11.40	8.87	8.00
534 540 1115	†Wm. Penn Crop Grower, -----	Isaac Shivery, McClure, ----- H. A. Snyder, Strawberry Ridge, -----	9.83	9.39	8.00
1017 1521	READING BONE FERTILIZER CO., READING, PA.				
1356	Blood, Meat and Potash Mixture, ----	H. F. Rittenhouse, Willow Grove, ----- Geo. Rafferty, Grampian, ----- B. H. Hershey, Manheim, ----- A. C. Smith, Burlington, ----- H. F. Kern, Catawissa, R. D. 1, ----- Grover O. Myers, Gardners Station, ----- B. H. Hershey, Manheim, ----- E. L. Wengert, Ono, ----- G. H. Anderson, Muncy, R. D. 7, ----- B. H. Hershey, Manheim, ----- W. W. Moses, Exton, -----	9.52	8.73	8.00
807 286 890 1348	†Farmers Tankage and Potash for ----- Corn, Grain and Grass. ----- Farmers Union Fertilizer, -----	Geo. Rafferty, Grampian, ----- B. H. Hershey, Manheim, ----- A. C. Smith, Burlington, ----- H. F. Kern, Catawissa, R. D. 1, ----- Grover O. Myers, Gardners Station, ----- B. H. Hershey, Manheim, ----- E. L. Wengert, Ono, ----- G. H. Anderson, Muncy, R. D. 7, ----- B. H. Hershey, Manheim, ----- W. W. Moses, Exton, -----	8.80 6.86	7.86 9.29	8.00 8.00
1150	†Never Fall Crop Grower, -----	Grover O. Myers, Gardners Station, ----- B. H. Hershey, Manheim, ----- E. L. Wengert, Ono, ----- G. H. Anderson, Muncy, R. D. 7, ----- B. H. Hershey, Manheim, ----- W. W. Moses, Exton, -----	9.75	7.94	8.00
285 1540 596 288	†Reading Special Potato and Tobacco Grower. -----	B. H. Hershey, Manheim, ----- W. W. Moses, Exton, -----	5.12	6.50	6.00
1146					

†Composite sample.

LIZERS—Continued.

Acid in 100 Pounds.			Potash in 100 Pounds.				Nitrogen. in 100 lbs.		Computed commercial value of 2,000 pounds at Department rating.	Selling price of 2,000 pounds at point of selection.	Sample number.
Insoluble.	Total.		Present as muriate.	Present as sulphate.	Total.		Found.	Guaranteed.			
	Found.	Guaranteed.			Found.	Guaranteed.					
1.16	7.87	7.00	7.02	-----	7.02	7.00	1.56	1.6	26.37	28.00 128.00 25.50	943 474 1193
1.73	10.10	9.00	2.25	-----	2.25	2.00	1.55	1.65	28.49	122.00 23.00	47 116
2.70	11.53	9.00	2.85	-----	2.85	3.00	1.55	1.35	25.06	-----	175
1.15	9.82	9.00	8.13	2.32	10.45	10.00	.88	.82	29.17	26.00	1197
1.68	10.65	10.00	3.75	-----	3.75	3.00	.92	.82	22.50	20.00	25
1.20	9.41	9.00	4.83	-----	4.83	4.00	.84	.82	22.36	21.00	531 41
										19.25 22.00	1508 983
2.64	10.56	9.00	3.26	-----	3.26	3.00	1.57	1.65	24.54	122.00 80.00	186 1613
1.70	9.92	9.00	2.31	-----	2.31	2.00	.90	.82	20.25	23.00 19.00 22.00	839 475 1361
1.66	10.59	9.00	.98	8.41	*9.34	10.00	1.64	1.65	33.30	26.50	1007
1.35	9.28	9.00	2.70	-----	2.70	2.00	.42	.41	17.84	15.00 17.00	676 43
										17.00	982
1.68	10.26	9.00	2.20	2.92	5.12	5.00	1.57	1.65	27.10	----- 23.00	584 540
1.70	11.09	9.00	1.32	-----	1.32	1.00	.87	.82	20.22	20.00 117.50 17.00	1115 1017 1521
1.02	9.75	9.00	2.29	-----	2.29	2.00	1.62	1.64	23.84	-----	1356
1.12	8.98	9.00	4.41	-----	4.41	4.00	.80	.82	21.28	121.00 23.50 21.50	288 877 890
.71	9.91	9.00	7.73	-----	*7.73	8.00	*1.38	1.64	27.55	25.00	1348
										19.00	1150
1.33	9.27	9.00	1.59	-----	1.59	1.00	.83	.82	18.87	120.00 18.60 22.00	285 1540 595
1.16	7.66	7.00	7.50	-----	7.50	7.00	.79	.82	23.08	124.00 25.00	288 1116

*Constituent falls below guaranty.

COMPLETE FERTI

Sample number.	Manufacturer and Brand.	From Whom Sample Was Taken.	Moisture in 100 pounds.	Phosphoric	
				Available.	
				Found.	Guaranteed.
504 886 736 394 17 684 508 287 1711	†Reading Sterling Potato Grower, --- †Schuylkill Valley Favorite for Grain and Grass. †Tobacco and Truck Special, -----	E. H. Carl, Coopersburg, ---- Geo. Rafferty, Gramplan, ---- J. K. Mellinger, West Willow, Geo. Rafferty, Gramplan, ---- M. A. McMillmney, Pine Grove, J. H. Sheaffer, Greason, ---- E. H. Carl, Coopersburg, ---- B. H. Hershey, Manheim, ---- W. H. Strass, Lehighton, ----	9.31 5.26 7.91	8.49 7.08 6.36	8.00 7.00 6.00
ROBERT A. REICHARD, ALLEN-TOWN, PA.					
1884 1832 1846 1861 1845	†Golden Harvest Phosphate, ----- †Lehigh Potato Manure, ----- Little Giant Phosphate, ----- Truckers Favorite, -----	N. D. Hunsicker, Snyder, ---- T. Bettz, New Mahoning, ---- N. D. Hunsicker, Snyder, ---- T. Bettz, New Mahoning, ---- R. S. Kemmerer, Bowmans, ---- T. Bettz, New Mahoning, ----	8.54 6.56 6.21 7.33	8.19 8.08 *6.32 *5.59	8.00 8.00 7.00 6.00
F. S. ROYSTER GUANO CO., NORTH ERN DIVISION, BALTIMORE, MD.					
522 1161 517 468 1159	†Ammoniated Potash Compound, ---- †Big Yield Potato Producer, -----	Amandus Wotring, Schnecks-ville. H. Cook & Co., Dillsburg, -- Amandus Wotring, Schnecks-ville. Chas. Mensh, Mifflinburg, ---- H. Cook & Co., Dillsburg, --	5.71 4.97	8.99 5.28	9.00 5.00
1978	†Fish, Flesh and Fowl, -----	P. Beeby, Montrose, -----	9.56	8.39	8.00
528 424 912 462 415 1394 1970 1972	 †Gold Seal Potato and Tobacco Special †Imperial Formula, ----- †Lehigh Potato Grower, ----- †Royster's Challenge Complete Compound.	Amandus Wotring, Schnecks-ville. E. C. Rogers, Brooklyn, ---- H. N. Sweigart, Gap, ---- Chas. Mensh, Mifflinburg, ---- S. H. Page, New Milford, ---- J. K. Adams, Berwick, R. D. 3 J. K. Hockley, Emporium, ---- P. P. Beeby, Montrose, ----	 8.06 8.18 8.23 11.86	 *7.74 8.23 7.06 8.21	 8.00 8.00 7.00 8.00
519 428 911 780 779	 †Royster's Champion Crop Compound Royster's Complete Potato Manure, --- Royster's Corn and Hop Special Fertilizers.	Amandus Wotring, Schnecks-ville. E. O. Rogers, Brooklyn, ---- H. N. Sweigart, Gap, ---- Wm. A. Russell, Carbondale, --- Wm. A. Russell, Carbondale, ---	 7.67 5.06 7.22	 8.50 5.84 8.36	 8.00 6.00 8.00
1340 1162 1370	†Royster's Farmers Delight, -----	John McKnall, Kane, ----- H. Cook & Co., Dillsburg, --- John D. Morris, Blossburg, --- Chas. Mensh, Mifflinburg, ---	6.11	7.83	8.00
461 524	†Royster's General Crop Fertilizer,----	Amandus Wotring, Schnecks-ville.	7.41	8.54	8.00

†Composite sample.

LIZERS—Continued.

Acid in 100 Pounds.			Potash in 100 Pounds.				Nitrogen. in 100 lbs.		Computed commercial value of 2,000 pounds at Department rating.	Selling price of 2,000 pounds at point of selection.	Sample number.
Insoluble.	Total.		Present as muriate.	Present as sulphate.	Total.		Found.	Guaranteed.			
	Found.	Guaranteed.			Found.	Guaranteed.					
1.36	9.85	9.00	9.64	-----	*9.64	10.00	.74	.82	27.16	{ 27.00 129.50	504 396 736
1.10	8.18	8.00	2.50	-----	2.50	2.00	.55	.41	17.37	{ 20.00 119.00 18.00	394 17 624
.88	7.24	7.00	6.71	-----	6.71	6.00	2.81	2.46	29.19	{ 27.00 130.00 81.50	503 287 1711
2.21	10.40	10.00	5.47	-----	5.47	5.00	1.62	1.64	27.06	{ 124.00 27.00	1831 1847
1.94	10.62	10.00	9.61	-----	*9.61	10.00	1.53	1.64	31.32	{ 128.00 32.00	1832 1846
1.75	*8.07	8.50	1.46	-----	1.46	1.00	.97	.82	17.71	{ 21.00	1861
2.14	7.73	7.50	8.94	-----	8.94	8.00	2.61	3.28	37.56	{ 37.00	1845
.60	*9.59	10.00	7.31	-----	7.31	7.00	.81	.82	25.16	{ 123.00 22.75	522 1161
.33	*5.61	6.00	10.13	-----	10.13	10.00	1.46	1.65	27.26	{ 26.00 123.00	517 463 1159
.41	*8.80	9.00	3.21	-----	3.21	3.00	1.52	1.65	23.62	{ 119.67	1973
1.17	8.91	9.00	9.97	-----	9.97	10.00	1.72	1.65	31.17	{ 27.50 133.50 31.00 18.00	523 424 912 462
.67	8.90	9.00	4.54	-----	4.54	4.00	.90	.82	22.09	{ 21.00	415 1364
.52	*7.53	8.00	*14.59	-----	14.59	15.00	.90	.82	31.10	{ 1970	
.66	8.87	9.00	6.03	-----	6.03	6.00	1.58	1.65	26.92	{ 1972	
.54	9.04	9.00	4.46	-----	4.46	4.00	1.77	1.65	26.28	{ 23.00 128.50 24.00	519 428 911
.79	*6.63	7.00	11.16	-----	11.16	10.00	*3.14	3.30	37.24	{ 32.06	780
.96	9.32	9.00	3.55	-----	3.55	3.00	2.10	2.66	27.08	{ 23.40	779
.36	*8.19	9.00	2.25	-----	2.25	2.00	.68	.41	17.98	{ 25.00 116.50 20.00	1340 1162 1370
.70	9.24	9.00	5.44	-----	5.44	5.00	.87	.82	23.10	{ 118.75 21.00	461 524

*Constituent falls below guaranty.

COMPLETE FERTI

Sample number.	Manufacturer and Brand.	From Whom Sample Was Taken.	Phosphoric		
			Available.		
			Moisture in 100 pounds.	Found.	Guaranteed.
22	†Royster's Golden Harvest Fertilizer, ..	E. E. Behney, Snedburg, ...	7.20	8.17	8.00
1342		N. O. Creasy, Catawissa, ...			
790	Boyster's Good Cheer Brand, ...	A. L. Miller, Clarks Summit, ..	8.03	8.60	8.00
1968	Practical Truck Guano, ...	W. F. Müller, Tamaqua, R. D. ..	11.26	8.47	8.00
1376		R. J. Dunham, Wellsboro, ...			
1160	†Royster's Prolific Potato Producer, ..	H. Cook & Co., Dillsburg, ...	6.48	6.40	6.00
1799		D. C. Brittain, Reglater, ...			
		Thomas Garrison, Berwick, R. D. 2.	6.01	9.40	9.00
1365	†Royster's Seeding Down Special Fer- tilizer, ...	John D. Morris, Blossburg, ..			
1368		F. H. Behney, Snedburg, ...	6.96	8.71	8.00
19	Royster's Truck Favorite, ...	N. O. Creasy, Catawissa, ...	10.73	*7.75	8.00
1969	Royster's Wheat, Oats and Barley Fertilizer, ...				
425	Royster's Special Wheat and Corn and Grass Producer, ...	E. C. Rogers, Brooklyn, ...	9.29	9.63	9.00
1388	Universal Crop Grower, ...	C. S. Chamberlain, Sabins- ville, ...	6.48	7.89	7.00
427	Universal Truck Fertilizer, ...	F. C. Rogers, Brooklyn, ...	8.20	8.22	8.00
	SCHAAL-SHELDON FERTILIZER CO., BUFFALO, N. Y.				
1100	Guano, ...	Brooklyn Milling Co., Spar- tanburg, ...	11.76	8.63	8.00
1101	Schaal's Corn and Potato, ...	Brooklyn Milling Co., Spar- tanburg, ...	13.88	8.91	8.00
	SCOTT FERTILIZER CO., THE, ELKTON, MD.				
738	†Corn and Oats Grower, ...	S. Book & Bros., Quarryville, ..	6.51	8.37	8.00
1072		Elias S. Brubacher, Richland, ..			
368	†Scott's Grain Special, ...	R. Fogle, Hecktown, ...	9.51	8.28	8.00
740		S. Book & Bros., Quarryville, ..			
638		John B. Satterthwaite, Wood- bourne, ...			
367	†Scott's Potato Grower, ...	R. Fogle, Hecktown, ...	9.25	7.63	6.00
1855		A. M. Diehl, Wiseport, ...			
513	†	W. H. Diehl, Northumberland, ..			
		R. D. 1.			
739	†Scott's Potato and Truck Special, ..	S. Book & Bros., Quarryville, ..	8.01	9.01	7.00
1127		B. W. Jones, Doe Run, ...			
639	Scott's Sure Growth Compound, ...	John B. Satterthwaite, Wood- bourne, ...	7.52	7.89	7.00
		John B. Satterthwaite, Wood- bourne, ...			
634	†Scott's Sure Growth Super Phosphate	A. B. Groff, New Holland, ...	6.50	8.23	8.00
766					
	A. B. SCHUMACHER, HAZLETON, PA.				
1813	Special Brand, ...	E. Frederick, Conyngham, ...	7.72	*6.48	7.00
	M. L. SHOEMAKER & CO., LTD., PHILADELPHIA, PA.				
16		H. & G. Genesamer, Paradise, ..			
3	†Swift Sure Guano for Tomatoes, ..	U. E. Rhein, Rock, ...	9.55	9.08	8.00
258	Truck and Corn, ...	J. B. Shaffer, Swatara, ...			

†Composite sample.

LIZERS—Continued.

Acid in 100 Pounds.			Potash in 100 Pounds.				Nitrogen. in 100 lbs.		Computed commercial value of 2,000 pounds at Department rating.	Selling price of 2,000 pounds at point of selection.	Sample number.
Insoluble.	Total.		Present as muriate.	Present as sulphate.	Total.		Found.	Guaranteed.			
	Found.	Guaranteed.			Found.	Guaranteed.					
.37	*8.54	9.00	2.50	-----	2.50	2.00	1.59	1.65	23.17	{ 118.00	22
.37	8.97	9.00	2.88	-----	2.88	2.00	1.11	1.02	21.07	{ 22.00	1342
.77	9.24	9.00	6.08	-----	6.08	6.00	2.41	2.47	31.18	{ 22.00	790
										{ 126.50	1968
										{ 25.00	1376
.84	*6.72	7.00	4.86	-----	4.86	5.00	1.12	1.23	21.32	{ 121.00	1160
										{ 23.00	1799
.57	9.97	10.00	3.43	-----	3.43	3.00	.78	.82	21.61	{ 119.75	1365
.84	9.55	9.00	6.46	-----	6.46	5.00	*3.97	4.94	39.46	{ 22.00	1368
.39	*8.14	9.00	2.28	-----	2.28	2.00	.85	.82	18.93	{ 37.00	19
										{ 118.00	1990
.35	9.96	10.00	2.41	-----	2.41	2.00	.78	.82	20.70	{ 24.50	425
.47	8.36	8.00	1.41	-----	1.41	1.00	.91	.82	18.43	{ 18.00	1388
.93	9.15	9.00	6.52	-----	*6.52	7.00	*2.84	2.29	33.54	{ 38.50	427
1.35	9.98	9.00	4.23	-----	4.22	4.00	.97	.82	22.71	{ 25.00	1100
1.17	10.06	9.00	4.30	-----	4.30	4.00	1.56	1.65	25.87	{ 29.00	1101
3.12	11.49	-----	2.73	-----	2.73	2.00	.74	.41	20.86	{ 118.00	788
2.89	11.17	-----	4.88	-----	4.83	4.00	.83	.41	22.83	{ 18.00	1072
										{ 20.00	368
										{ 29.00	746
3.21	10.84	-----	10.33	-----	10.33	10.00	1.85	1.65	32.70	{ 29.00	367
										{ 24.00	1855
										{ 24.00	913
1.72	10.73	-----	5.30	-----	5.30	5.00	1.09	1.65	27.99	{ 124.00	739
1.91	9.80	-----	7.77	-----	7.77	7.00	3.41	3.30	37.60	{ 25.00	1127
										{ 35.00	689
2.04	10.26	-----	4.46	-----	4.46	3.00	1.75	1.65	25.98	{ 124.00	684
										{ 24.00	766
1.53	8.06	-----	9.24	-----	9.24	6.00	2.15	1.24	31.58	{ 25.00	1813
1.81	10.89	10.00	5.62	-----	5.63	5.00	1.56	1.65	27.70	{ 25.50	16
										{ 124.75	3
										{ -----	256

*Constituent falls below guaranty.

COMPLETE FERTI

Sample number.	Manufacturer and Brand.	From Whom Sample Was Taken.	Moisture in 100 pounds.	Phosphoric	
				Available.	
				Found.	Guaranteed.
4	†Swift Sure New Jersey Special for	U. E. Rhein, Rock, -----	8.80	9.68	8.00
1545	Oats.	Aaron Bicksler, Fredericksburg			
629	Swift Sure Special 10 Per Cent. Potato Fertilizer No. 1.	W. E. Erwin, Somerton, -----	8.48	7.48	6.00
259	†Swift Sure Special 10 Per Cent.	J. B. Shaffer, Swatara, -----	7.90	8.94	8.00
630	Potato Fertilizer No. 2.	W. E. Erwin, Somerton, -----			
628	Swift Sure Super Phosphate for Potatoes.	W. E. Erwin, Somerton, -----	7.46	9.44	8.00
	OHAS. A. SICKLER & BRO., WILKES-BARRE, PA.				
423	†Empire Phosphate, -----	M. McVicar, Hop Bottom, ---	8.87	*5.90	8.00
1807		Ariel Klinger, Conyngham, ---			
422	†Graves Potato and Tobacco Manure,	M. McVicar, Hop Bottom, ---	9.60	*5.18	6.00
1806		Ariel Klinger, Conyngham, ---			
	SMITH AGRICULTURAL CHEMICAL CO., THE, COLUMBUS, OHIO.				
1391	Ohio Farmer's Ammoniated Phosphate and Potash.	C. R. Forbes, Albion, -----	7.24	9.37	8.00
1392	Ohio Farmer's Corn, Oats and Wheat Fertilizer.	C. R. Forbes, Albion, -----	5.78	*7.40	8.00
1396	Ohio Farmer's Excelsior Phosphate,	C. O. Kirkland, Girard, -----	6.51	11.13	8.00
1394	Ohio Farmer's Potato and Tobacco Special.	C. O. Kirkland, Girard, -----	6.77	8.15	8.00
1398	Ohio Farmer's Wheat Maker and Seeding Down.	C. O. Kirkland, Girard, -----	5.52	8.44	8.00
	SOUTHERN FERTILIZER CO., THE, YORK, PA., BY A. A. C. Co., N. Y.				
1500		Elmer H. Shaffer, Berwick, R. D. 2.			
1362	†Potato, Truck and Tobacco, -----	Elmer H. Shaffer, Berwick, R. D. 3.	8.40	9.00	8.00
1868		Henry Weaver, Tripoli, -----			
506	Special Potato Grower, -----	Bastion & Romig, Wescosville,	11.35	8.87	8.00
	J. L. & H. STADLER RENDERING FERTILIZER CO., CLEVELAND, OHIO.				
928	Stadler's Corn and Wheat Special, ---	McMungle & Bros., Jamestown,	12.23	8.25	8.00
	STRAYER BROS. & CO., BY YORK CHEMICAL WORKS, YORK, PA.				
1207	Strayer's Special Wheat and Corn Fertilizer.	Strayer Bros., West York, ---	12.11	8.53	8.00
	SWIFT & CO., CHICAGO, ILL.				
556	Swift's Pure Diamond O Fertilizer,---	R. G. Young Sons, New Gallilee.	11.25	8.25	8.00
557	Swift's Pure Grain Fertilizer, -----	R. G. Young Sons, New Gallilee.	11.47	8.53	8.00
554	Swift's Pure Onion, Potato and Tobacco Fertilizer.	R. G. Youngs Sons, New Gallilee.	10.92	8.68	8.00
1050	Swift's Pure Special Potato Fertilizer,	Thomas Haines & Co., Malvern.	4.00	*7.61	8.00
1232		W. J. Kennedy Hardware Co., Mars.			
555	†Swift's Pure Super Phosphate, -----	R. G. Youngs Sons, New Gallilee.	6.64	*7.23	8.00
1043		Thomas Haines & Co., Malvern.			

†Composite sample.

LIZERS—Continued.

Acid in 100 Pounds.			Potash in 100 Pounds.				Nitrogen. in 100 lbs.		Computed commercial value of 2,000 pounds at Department rating.	Selling price of 2,000 pounds at point of selection.	Sample number.
Insoluble.	Total.		Present as muriate.	Present as sulphate.	Total.		Found.	Guaranteed.			
	Found.	Guaranteed.			Found.	Guaranteed.					
2.01	11.64	11.00	2.81	-----	2.81	2.00	1.15	.82	23.58	{ 119.50	4
.98	8.41	8.00	8.93	-----	*8.93	10.00	*2.86	3.30	35.32	{ 19.00	1545
1.62	10.56	10.00	10.88	-----	10.88	10.00	1.73	1.65	33.82	{ 34.00	629
2.35	11.79	11.00	7.63	-----	7.63	7.00	2.70	2.88	35.92	{ 29.00	250
										{ 32.00	630
											628
1.57	*7.47	9.00	2.81	-----	2.81	2.00	1.56	1.65	21.46	{ 121.00	423
1.78	6.96	-----	4.16	-----	*4.16	5.00	1.43	1.24	21.72	{ 24.00	1807
										{ 128.00	423
										{ 23.00	1806
.52	9.89	9.00	4.00	-----	4.00	4.00	.79	.82	22.15	23.00	1391
1.09	*8.48	9.00	2.27	-----	2.27	2.00	1.12	1.24	20.06	23.00	1392
.98	12.11	9.00	7.18	-----	7.18	7.00	*.68	.82	26.94	26.00	1295
1.69	9.74	9.00	3.82	-----	3.82	4.00	*1.40	1.65	24.06	25.00	1394
1.37	9.81	9.00	2.07	-----	2.07	2.00	.83	.82	19.83	21.00	1393
1.36	10.36	9.00	9.21	-----	*9.21	10.00	*1.10	1.65	28.89	{ 30.00	1600
										{ 180.00	1392
1.49	10.36	9.00	3.98	-----	3.98	4.00	1.14	1.23	23.74	{ 27.50	1838
										{ 20.65	506
1.82	10.07	9.25	3.97	-----	3.97	4.00	.91	.82	22.03	23.00	928
1.11	9.64	8.50	2.49	-----	2.49	2.00	.90	.82	20.58	18.00	1907
1.83	9.58	9.00	3.62	-----	*3.62	4.00	1.61	1.65	25.12	27.00	556
.97	9.50	9.00	2.17	-----	2.17	2.00	.94	.82	20.34	23.00	557
1.94	10.02	9.00	7.39	-----	7.39	7.00	1.77	1.65	29.77	29.00	554
2.85	10.46	9.00	9.42	-----	*9.42	10.00	1.81	1.65	31.75	30.00	1650
										{ 24.00	1292
2.11	9.37	9.00	2.06	-----	2.06	2.00	*1.45	1.65	19.45	{ 125.00	555
										{ 23.00	1648

COMPLETE FERTI

Sample number.	Manufacturer and Brand.	From Whom Sample Was Taken.	Molature in 100 pounds.	Phosphoric	
				Available.	
				Found.	Guaranteed.
1649	+Swift's Pure Truck Grower, ...	Thomas Haines & Co., Malvern.	7.10	7.96	8.00
1410		Fred. Rohling, McKean, ...			
1778		Isaman Carriage Co., Clarion, ...			
	TAYLOR 'PROVISION CO., THE, TRENTON, N. J.				
1671	Special Potato Fertilizer, ...	J. L. Hibbs, Edgley, ...	12.58	8.44	8.00
1670	Standard Grain Grower, ...	J. L. Hibbs, Edgley, ...	13.27	8.82	8.00
	J. M. TEMPLIN, HONEY BROOK, PA.				
1123	No. 8 High Grade Potash Manure, ..	J. M. Templin, Honey Brook, ..	11.00	*10.17	11.00
	D. A. THOMAS & CO., HAGERS-TOWN, MD.				
1008	Empire, ...	E. W. Rupp, Shiremanstown, ..	9.53	8.98	8.00
1040	Keystone Compound, ...	Nickles & Stewart, Shippensburg.	7.85	9.58	8.00
	+Planters Mixture, ...	Nickles & Stewart, Shippensburg.	8.74	9.25	8.00
1038		E. W. Rupp, Shiremanstown, ..			
1009	I. P. THOMAS & SONS CO., PHILADELPHIA, PA.				
915	+Normal Phosphate, ...	Wm. J. Moyer, Greenville, ...	9.96	9.51	8.50
1136	+Potato Fertilizer, ...	J. K. Lewis, Honeybrook, ...	6.68	9.24	9.00
451		E. D. Snyder, Lindaville, ...			
192		Mulholland & Dale, Montourville.			
918		Wm. J. Moyer, Greenville, ...			
1963	+Special Potato Manure, ...	J. P. Myers, Longsdorf, ...	7.10	7.29	7.00
1497	+Superior Super Phosphate, ...	West & West, Waynesboro, ...	16.28	*6.75	7.00
1811	+Thomas' Wheat and Corn Fertilizer, ..	John Davis, St. Johns	9.51	10.08	9.00
323		Webster Hdw. Co., Newbury			
256		John Engle, Hummelstown, ...			
1298	+Truckers High Grade Guano, ...	Lamont Berry, Troy, ...	8.91	8.80	7.00
919		Wm. J. Moyer, Greenville, ...			
1513		C. R. Henrie & Son, Millville.			
490	+Victor Potash Manure, ...	O. H. Kessler, Mabel, ...	8.41	*7.79	8.00
421		Snyder & Bookstader, Foster, ...			
1498		West & West, Waynesboro, ...			
	JAMES THOMAS, WILLIAMSPORT, PA.				
851	+Thomas' Klondyke Brand Phosphate, ..	John Horning, Pennfield, ...	10.27	9.68	9.00
704		Keystone Hdw. Co., Reynolds-ville.			
886		F. E. Shoemaker, Granville Summit.			
708	+Thomas' Potato and Truck Manure, ..	Keystone Hdw. Co., Reynolds-ville.	10.43	8.14	8.00
318		James Thomas, Larrys Creek, ...			
850		John Horning, Pennfield, ...			
	+Thomas' Special Compound for Wheat, Oats, Corn and Grass.	Smith Bros., Ridgeway, ...	11.73	8.94	9.00
863		F. E. Shoemaker, Granville Summit.	11.73	8.94	9.00
888		Keystone Hdw. Co., Reynolds-ville.			
705	+Thomas' Standard Brand Phosphate, ..	James Thomas, Williamsport, ...	12.36	8.06	8.00
322		John Horning, Pennfield, ...			
852					

+Composite sample.

LIZERS—Continued.

Acid in 100 Pounds.			Potash in 100 Pounds.				Nitrogen. in 100 lbs.		Computed commercial value of 2,000 pounds at Department rating.	Selling price of 2,000 pounds at point of selection.	Sample number.
Insoluble.	Total.		Present as muriate.	Present as sulphate.	Total.		Found.	Guaranteed.			
	Found.	Guaranteed.			Found.	Guaranteed.					
1.30	9.26	9.00	3.56	-----	*3.56	4.00	.96	.82	21.34	{ 22.00	1649
										{ 125.00	1410
										{ 25.00	1778
1.06	9.52	-----	9.82	-----	9.82	10.00	2.26	2.06	24.32	31.00	1671
1.34	10.16	-----	2.67	-----	2.67	2.50	1.41	.82	23.44	24.00	1670
1.35	*11.53	12.00	7.28	-----	*7.28	8.00	.78	.82	27.64	26.00	1133
.77	9.76	9.00	8.70	-----	*8.70	10.00	*1.15	1.65	28.34	28.00	1068
.88	9.96	9.00	4.37	-----	4.37	4.00	.85	.82	22.88	21.00	1040
.62	9.87	9.00	5.95	-----	5.95	6.00	.81	.82	24.03	{ 124.00	1038
										{ 21.00	1069
2.21	11.72	9.50	2.90	-----	2.90	1.50	1.33	1.00	24.60	{ 120.00	915
										{ 22.00	1136
										{ 30.00	431
1.34	10.58	10.00	5.91	-----	5.91	6.00	*1.44	1.60	27.46	{ 126.50	192
										{ 28.00	918
1.23	8.58	8.00	10.21	-----	10.21	10.00	1.44	1.60	29.84	118.00	1963
1.10	7.85	8.00	1.76	-----	1.76	1.00	.89	.82	17.92	{ 118.00	1497
										{ 20.00	1811
.59	10.32	10.00	3.25	-----	3.28	3.00	.85	.82	22.39	{ 23.00	323
										{ 119.50	256
										{ 24.00	1298
.62	9.42	8.00	7.67	-----	7.67	7.00	*2.97	3.25	35.62	{ 132.00	919
										{ 32.00	1513
										{ 22.00	490
1.38	9.17	9.00	4.83	-----	4.83	5.00	.95	.82	22.53	{ 24.00	421
										{ 24.00	1496
1.96	11.64	10.00	2.42	-----	*2.42	3.00	1.01	.82	29.48	{ 28.00	851
										{ 124.00	704
										{ 24.00	886
										{ 24.00	703
1.52	9.66	9.00	4.81	-----	4.81	5.00	1.49	1.65	25.53	{ 128.00	818
										{ 32.00	850
1.50	10.44	10.00	2.46	-----	*2.46	2.00	1.11	1.00	22.03	{ 125.00	863
										{ 24.00	898
1.52	9.57	9.00	1.44	-----	1.44	1.00	.95	.82	19.39	{ 22.00	705
										{ 120.00	828
										{ 26.00	852

*Constituent falls below guaranty.

COMPLETE FERTI

Sample number.	Manufacturer and Brand.	From Whom Sample Was Taken.	Moisture in 100 pounds.	Phosphoric	
				Available.	
				Found.	Guaranteed.
TRENTON BONE FERTILIZER CO., TRENTON, N. J.					
1677	Ammoniated Dissolved Bone, -----	Wm. Hobensack, Ivyland, ---	7.80	8.22	8.00
1674	Keystone Potato Manure, -----	L. A. Howells, Morrisville, ---	8.79	8.73	8.00
1672	Special Corn Manure, -----	L. A. Howells, Morrisville, ---	8.08	8.90	8.00
1673	Trenton Corn Mixture, -----	L. A. Howells, Morrisville, ---	7.96	8.12	7.00
1675	Trenton High Grade Potato Fertilizer.	L. A. Howells, Morrisville, ---	8.90	7.41	6.00
JACOB TRINLEY & SONS, LINFIELD, PA.					
1145	Ravene Phosphate for all Crops, ----	Isaac Hartman, Anselma, ---	9.02	9.69	9.00
F. W. TUNNELL & CO., INC., PHILADELPHIA, PA.					
751	Ammoniated Phosphate and Potash, ---	H. O. Breckbill, Strassburg, ---	8.58	7.61	7.00
658	†No. 1 Special High Grade Potato Manure.	P. Michael, Mt. Bethel, -----	9.96	7.42	8.00
1108		J. C. Rhoads & Co., Newton Square.			
228	†Potato and Grain Manure, -----	D. D. Wagner, Easton, Pa., ---	13.81	6.84	7.00
1367	†Raw and Acidulated Animal Compound.	O. E. Rauscher, Blossburg, ---	8.70	11.35	10.00
752		H. O. Breckbill, Strassburg, ---			
1875		A. R. Decker, Mansfield, ---	12.14	7.45	7.00
896		Jones Eavenson, Christiana, ---			
1108	†Royal Fish Guano, -----	Howard Van Artsdalen, New- ton.			
1315		Carl Nichols, Liberty, -----	6.18	7.01	7.00
1828		J. A. Yost, Ringtown, -----			
1747	†Sweet and White Potato Manure, ---	Tyson Stauffer, Barto, -----	11.06	7.14	6.00
1874		D. G. Davis, Ebensburg, -----			
1	†Tunnell's Special High Grade Potato	Levi Behny, Pine Grove, -----	8.28	8.08	8.00
1873	Manure.	D. G. Davis, Ebensburg, -----			
TUSCARORA FERTILIZER CO., BALTIMORE, MD.					
1385	Big Four, -----	Roy Ackley, Sabinsville, -----	8.50	8.01	7.00
1224	Crop Grower, -----	J. I. Yetter, Saylorsburg, ---	6.92	9.75	8.00
670	†Fruit and Potato, -----	J. I. Yetter, Saylorsburg, ---	8.78	8.75	8.00
796		Daniel Hollandstein, Milton, ---			
796		R. D. 1.	7.43	7.63	8.00
1223	†Sure Grower, -----	Daniel Hollandstein, Milton, ---			
1225	York State Special, -----	J. I. Yetter, Saylorsburg, ---			
J. E. TYGERT CO., PHILADELPHIA, PA., BY A. A. C. CO., N. Y.					
1358	Early Truck Guano, -----	Geo. S. Miller, Mifflinville, ---	9.94	6.97	6.00
131	Golden Harvest Phosphate, -----	Dufton Hdw. Co., Clearfield, ---	8.46	8.08	8.00
1859	Potato Fertilizer, -----	J. Serfoss, Kresgeville, -----	6.25	7.01	6.00
1380	10 Per Cent. Grain Grower, -----	Geo. S. Miller, Mifflinville, ---	9.15	8.04	7.00
140	†Tygert's Ammoniated Super Phos-	Jacob Hummel, Bigler, -----	9.90	8.54	8.00
1859	phate.	Geo. S. Miller, Mifflinville, ---	11.36	8.17	7.00
139	Tygert's Gold Edge Potato Guano, ---	Jacob Hummel, Bigler, -----			
409	†Tygert's Standard Fertilizer, -----	Cyrenus Donnelly, Chocnut, ---	7.88	8.12	8.00
696		Sykesville Hdw. Co., Sykesville	11.01	8.67	5.00
72	Tygert's Victor Crop Grower, -----	Cyrenus Donnelly, Chocnut, ---			

†Composite sample.

LIZERS—Continued.

Acid in 100 Pounds.			Potash in 100 Pounds.				Nitrogen. in 100 lbs.		Computed commercial value of 2,000 pounds at Department rating.	Selling price of 2,000 pounds at point of selection.	Sample number.
Insoluble.	Total.		Present as muriate.	Present as sulphate.	Total.		Found.	Guaranteed.			
	Found.	Guaranteed.			Found.	Guaranteed.					
2.17	10.39	-----	5.18	-----	5.18	4.00	1.87	1.65	28.08	28.00	1677
.29	9.02	-----	9.94	-----	9.94	10.00	1.97	1.65	32.95	30.00	1674
1.40	10.30	-----	3.55	-----	3.85	3.00	1.67	1.65	26.00	25.00	1672
1.87	9.99	-----	4.10	-----	4.40	3.00	1.97	1.65	27.45	27.00	1673
.77	8.18	-----	8.89	-----	*5.89	10.00	3.15	3.29	36.56	36.00	1675
1.53	11.22	10.00	3.60	-----	3.60	3.00	1.00	1.24	23.49	23.00	1145
.70	8.31	8.00	2.25	-----	2.25	2.00	.46	.21	16.94	20.00	751
.64	*8.06	10.00	9.47	-----	*9.47	10.00	2.88	2.47	35.82	{ 130.00 32.00	653 1108
1.13	7.97	8.00	4.36	-----	4.36	4.00	1.70	1.65	24.49	{ 128.00 28.00	228 1367
9.64	20.99	20.00	.67	-----	.67	-----	*1.30	1.65	27.51	{ 128.00 22.00 27.00	752 1375 895
.73	*5.18	9.00	4.19	-----	4.19	3.00	*1.68	1.85	24.80	{ 127.00 30.00 30.00	1103 1315 1823
.98	*6.99	8.00	8.32	-----	8.32	8.00	2.00	1.65	29.07	{ 130.00 31.00	1747 1874
.67	*7.71	8.00	9.28	-----	*9.28	10.00	*2.19	2.47	32.01	{ 130.00 33.00	1 1873
.45	8.46	7.50	4.68	-----	4.68	4.00	1.60	1.65	25.26	25.00	1385
.58	10.33	8.50	2.46	-----	2.46	2.00	.88	.82	21.21	18.50	1221
.62	9.37	8.50	10.62	-----	10.62	10.00	*1.43	1.65	31.39	{ 128.00 25.00	670 795
.57	*8.20	8.50	3.32	-----	3.32	3.00	.57	.41	18.48	{ 115.00 17.50	796 1223
.60	8.68	8.50	4.33	-----	4.33	4.00	.85	.82	21.42	20.00	1225
1.19	8.16	7.00	2.59	-----	2.59	2.00	3.25	3.29	30.32	28.00	1358
.69	*8.77	9.00	2.69	-----	2.69	2.00	.58	.41	18.64	22.00	131
1.66	8.67	7.00	5.96	-----	5.96	5.00	.74	.82	22.00	24.00	1859
1.61	9.65	8.00	9.67	-----	*9.67	10.00	*1.03	1.23	23.26	28.00	1360
1.66	10.20	9.00	2.44	-----	2.44	1.50	1.27	1.23	22.41	{ 123.00 21.50	140 1359
1.28	9.45	8.00	5.01	-----	5.01	5.00	1.80	1.65	27.08	26.00	139
1.08	9.30	9.00	2.92	-----	2.92	2.00	1.09	1.65	24.61	{ 126.50 24.00	409 696
1.21	9.38	9.00	4.20	-----	4.20	4.00	.89	.82	22.46	24.00	72

*Constituent falls below guaranty.

COMPLETE FERTI

Sample number.	Manufacturer and Brand.	From Whom Sample Was Taken.	Phosphoric		
			Moisture in 100 pounds.	Available.	
				Found.	Guaranteed.
UNION CHEMICAL WORKS, NORTH WALES, PA.					
506 642	{Ideal Potato Manure Planting Brand	H. D. Sittler, Trexlertown, --- John D. Buckman, Newtown, }	7.42	9.14	8.00
UNION CHEMICAL CO., NORTH WALES, PA.					
643 1077 1590 294 1083	{Ideal Potato Manure, Top Dressing Brand. +Potato and Celery Special, -----	John D. Buckman, Newtown, } S. Z. Gettle, Myerstown, --- } S. Z. Gettle, Reitsville, ----- } Frank Dietrick, Friedensburg, } Henry K. Mohr, Quakertown, - }	9.15 8.20	8.81 7.29	8.00 7.00
UNITED STATES FERTILIZER CO., THE, BALTIMORE, MD.					
580 1013 1518 773 579 1016 870 583 1182 1183 1506	{Farm Bell Animal Ammoniated, ----- Farm Bell Buckeye Guano, ----- +Farm Bell Fruit and Potato Guano, +Farm Bell Pennant Winner, ----- +Farm Bell Standard Guano, -----	M. Gillis, Hughesville, ----- W. B. Winney, Middleburg, - } W. F. Slagle, Millville, ----- } A. W. Kenyon, Orlford, ----- } M. Gillis, Hughesville, ----- } W. B. Winney, Middleburg } Harry Baker, Tunkhannock, - } M. Gillis, Hughesville, ----- } J. C. Birley, New Oxford, --- } J. C. Birley, New Oxford, --- } M. F. Bowman, Orangeville, } R. D. }	5.98 6.10 6.64 7.35 5.40	9.14 9.17 8.98 10.61 8.55	8.00 9.00 8.00 8.00 8.00
VIRGINIA CAROLINA CHEMICAL CO., FOR RESALE BY RASIN MONUMENTAL CO., BALTIMORE, MD.					
715 986 717 718	{V. C. C. Co.'s National Ammoniated Guano. V. C. C. Co.'s Standard Corn and Grain Grower. V. O. C. Co.'s Standard Crop Grower,	N. H. Dainer, Brookville, --- } Isaac Kunkle, Winfield, ----- } N. H. Dainer, Brookville, ----- } N. H. Dainer, Brookville, ----- }	10.58 9.00 11.53	8.57 9.16 7.65	8.00 8.00 8.00
J. O. WALKER & SONS CO., GAP, PA.					
906 907	{Pride of Pequa High Grade, ----- Pride of Pequa, -----	J. G. Walker & Sons Co., Gap, } J. G. Walker & Sons Co., Gap, }	6.00 10.53	7.61 10.80	7.00 10.00
F. K. WALT CO., READING, PA.					
1351 1742 1139 7 1353 1352 1140 1741	{Walt's Ammoniated Phosphate, ----- +Walt's Special Potato Phosphate, ----- +Walt's X. X. Flesh Phosphate, -----	Samuel Shoup, Catawissa, --- } A. N. Schoener, Womelsdorf, } F. K. Walt Co., Loag's Corner, } J. A. Miller, De Turksville, --- } Zehner Bros., Bloomsburg, --- } Sam'l Shoup, Catawissa, --- } F. K. Walt Co., Loag's Corner, } A. N. Schoener, Womelsdorf, }	12.72 11.20 11.01	9.42 10.19 10.57	8.00 8.00 8.00

+Composite sample.

LIZERS—Continued.

Acid in 100 Pounds.			Potash in 100 Pounds.				Nitrogen in 100 Pounds.		Compound commercial value of 2,000 pounds at Department rating.	Selling price of 2,000 pounds at point of selection.	Sample number.
Insoluble.	Total.		Present as muriate.	Present as sulphate.	Total.		Found.	Guaranteed.			
	Found.	Guaranteed.			Found.	Guaranteed.					
.62	9.76	9.00	2.87	7.32	10.19	10.00	*2.98	3.30	39.85	{ 88.00	508 642
.70	9.51	9.00	6.10	4.05	10.15	10.00	*2.88	3.30	38.24	{ 128.00 37.00 28.00	643 1077 1530
1.10	8.39	8.00	3.33	7.03	10.36	10.00	1.61	1.65	31.88	{ 128.00 29.00 80.00	294 1668
.51	9.95	9.00	5.35	-----	5.35	5.00	1.85	1.65	29.46	{ 25.00	580
.70	9.87	10.00	3.30	-----	3.30	2.00	.77	.82	21.04	{ 120.00 19.50 80.00	1013 1518 773
.71	9.64	9.00	10.42	-----	10.42	10.00	1.74	1.65	32.88	{ 129.00 30.00 20.00	579 1016 870
.96	11.57	9.00	4.98	-----	4.98	4.00	*.57	.82	23.41	{ 120.50 19.00	583 1182
1.54	10.09	9.00	2.57	-----	2.57	2.00	1.56	1.65	23.91	{ 120.00 21.25	1183 1506
1.63	10.20	9.00	4.47	-----	4.47	4.00	.79	.82	22.29	{ 121.00 18.00	715 986
1.28	10.44	9.00	2.08	-----	2.08	2.00	.44	.41	18.67	{ 18.00	717
2.04	9.69	9.00	2.17	-----	2.17	2.00	1.80	1.65	24.02	{ 16.00	718
.89	8.50	-----	.93	6.51	*7.44	8.00	2.29	2.47	32.40	{ 29.00	906
.55	11.35	-----	3.21	-----	3.21	3.00	2.45	2.47	30.70	{ 25.00	907
4.02	13.44	9.00	1.29	-----	1.29	1.00	.74	.81	20.89	{ 117.00 17.50	1351 1742 1139
2.29	12.48	9.00	7.22	-----	*7.22	10.00	*1.20	1.84	29.01	{ 126.00 23.50 22.00	7 1353 1352
3.02	13.59	10.00	2.68	-----	*2.68	3.00	*.78	1.64	23.25	{ 1140 22.50	1140 1741

*Constituent falls below guaranty.

COMPLETE FERTI

Sample number.	Manufacturer and Brand.	From Whom Sample Was Taken.	Phosphoric		
			Available.		
			Moisture in 100 pounds.	Pound.	Guaranteed.
1082	W. E. WHANN CO., WILLIAM PENN. PA. Whann's Chester Valley Economist Fertilizer.	Milton Johnson, Quakertown, ..	11.78	9.32	8.00
1104	Whann's Chester Valley 10 Per Cent. Sweet Potato and Tomato Manure.	Ira Cornell, Newtown, ...	9.80	7.75	7.00
630	ROBERT A. WOOLDRIDGE CO., THE, BALTIMORE, MD. †Wooldridge's Champion Giant Phosphate.	S. B. Jackson, Carlisle, ...	11.07	9.40	9.00
470		Dershowe & Bennoge, White Deer, ..			
1798	Wooldridge's Fernwood Grange Mixture.	S. S. Sheller, Duncannon, ...	10.18	8.40	8.00
471		Dershowe & Bennoge, White Deer, ..			
440	†Wooldridge's Special Potato and Tobacco Fertilizer.	W. V. Shirk, Oakland Mills, ..	10.81	9.35	9.00
622		S. B. Jackson, Carlisle, ...			
619	Wooldridge's Triumph Brand Phosphate.	S. B. Jackson, Carlisle, ...	11.14	8.08	8.00
1725	WOOLDRIDGE FERTILIZER CO., THE, BALTIMORE, MD. F. F. V. Flesh & Fish Vegetator, ...	E. O. Hacker, Lincoln, Pa., ...	8.70	7.38	7.00
1512	Tiger Phosphate, ...	Grant Johnson, Millville, ...	9.30	8.90	8.00
373	YORK CHEMICAL WORKS, YORK, PA. Dempwolf's Harvest Queen, ...	G. Eddleman, Siegfried, ...	10.95	9.39	8.00
375		G. Eddleman, Siegfried, ...			
125	†Potato Manure, ...	B. J. Crissman, Ourwensville, ..	9.20	6.52	6.00
685		Peffer & Sons, Punxsutawney, ..			
1175	†Potato and Truck Special, ...	Henry N. Berkhelmer, Abbottstown, ..	9.89	7.97	8.00
163		A. T. Baird, Salona, B. D., Wm. J. Johnson, Sinking Springs, ..			
1740	†Spring Special, ...	J. H. Edmington, Petersburg, ..	9.56	7.07	7.00
1768		E. N. Erdly, Salem, ...			
1008		Lindner Swank, Ringtown, ...			
1817					

†Composite sample.

LIZERS—Continued.

Acid in 100 Pounds.			Potash in 100 Pounds.				Nitrogen in 100 Pounds.		Compound commercial value of 2,000 pounds at Department rating.	Selling price of 2,000 pounds at point of selection.	Sample number.
Insoluble.	Total.		Present as muriate.	Present as sulphate.	Total.		Found.	Guaranteed.			
	Found.	Guaranteed.			Found.	Guaranteed.					
1.20	10.52	9.00	2.17	-----	2.17	2.00	.52	.41	19.06	-----	1682
1.24	8.99	8.00	10.84	-----	10.84	10.00	*1.45	1.65	30.43	29.00	1104
1.05	10.45	10.00	2.18	-----	2.18	2.00	.92	.82	21.06	{ 19.75 119.00	620 470
.93	9.33	9.00	7.71	-----	*7.71	8.00	1.68	1.65	29.44	{ 22.00 26.00	1796 471
.94	10.19	10.00	5.68	-----	5.68	5.00	1.69	1.65	27.81	{ 125.00 25.00	440 622
1.59	9.62	9.00	4.00	-----	4.00	4.00	1.37	1.28	23.89	{ 22.50 22.50	619
1.19	8.57	7.50	6.56	-----	*6.56	7.00	*2.19	2.47	29.72	30.00	1725
1.02	9.92	8.50	4.49	-----	4.49	4.50	1.24	1.08	24.56	22.00	1512
1.17	10.56	8.50	2.14	-----	2.14	2.00	.77	.82	20.34	{ 19.00 22.50	373 375
1.03	7.55	6.50	6.92	-----	6.92	7.00	.77	.82	22.18	{ 123.00 28.00 31.00	125 685 1175
1.21	9.18	9.00	.67	6.30	6.97	7.00	2.38	2.47	32.98	{ 129.00 31.00	163 1740
1.71	*8.78	9.00	9.02	-----	*9.02	10.00	1.58	1.65	29.33	{ 21.00 128.95 27.00	1763 1003 1317

*Constituent falls below guaranty.

ROCK AND POTASH

Furnishing Phosphoric

Sample number.	Manufacturer and Brand.	From Whom Sample Was Taken.	Phosphoric		
			Moisture in 100 pounds.	Available	
				Found.	Guaranteed.
AMERICAN AGRICULTURAL CHEMICAL CO., THE, NEW YORK, N. Y.					
6	{High Grade Potash Mixture, -----	John A. Miller, De Turkville,	9.06	10.29	10.00
1501		H. S. Rittenhouse, Berwick,			
577		C. L. Shipman, Hughesville,			
509	{High Grade Phosphate and Potash,	J. Geissler, Tressertown, -----	11.58	12.37	12.00
		J. A. Witherspoon, Mercersburg.			
1489		G. R. Andrews, Enon Valley,			
357	{Bradley's Alkaline Phosphate and	J. E. Lynch, Friendsville, ---	9.45	9.87	10.00
67	Potash.	J. P. Jones, Summerville, ---			
730	Clark's Cove Triumph Phosphate and	Isaac M. Sheetz, Sunbury, R. D. 4.	10.00	10.61	10.00
966	Potash.	O. O. Salsburg, Ridgeway, ---	11.01	11.83	10.00
861	{Crocker's Dissolved Phosphate and	Edgar Waters, Jamestown, ---			
930	Potash.	Levi Berkey, Somerset, -----	12.27	10.71	10.00
1584	Detrick's Soluble Phosphate and Potash.	H. F. Rupp, Sipestown, -----	12.58	10.61	10.00
514	{Lazaretto Dissolved Phosphate and	Gonser Bros., Snyderstown, ---			
967	Potash.	S. M. Shuyler & Son, Liverpool.	10.11	10.44	10.00
1554	{Maryland Bono Super Phosphate, ---	Smith & McElvey, Blairsville, ---			
1915		S. M. Shuyler & Son, Liverpool.	9.92	11.79	11.00
1568	Maryland Linden Super Phosphate, ---	T. Kunkle, Easton, -----	10.48	9.97	10.00
378	Michigan Carbon Works Red Line Phosphate with Potash.	Wm. Howe, York Springs, ---	10.00	8.76	8.00
78	{Michigan Carbon Works Wheat and	T. Kunkle, Easton, -----			
379	Grass Fertilizer.	W. H. Mitman, Easton, R. F. D. 4.	10.64	10.40	10.00
227	{Milsom's Dissolved Phosphate and	Isaman Carriage Co., Clarion,			
1781	Potash.	J. E. Boust, Shamokin Dam,			
992		New Providence Coal Co., New Providence.	9.67	10.48	10.00
759	{Moro-Phillips Alkaline Phosphate, -	Nickles & Stewart, Shippensburg.			
1042		B. F. Walter, Christiansa, ---	10.25	8.81	8.00
890	Moro-Phillips Great Crop Fertilizer, ---	H. H. Gelst, Higgins, -----	12.08	10.35	10.00
300	Moro-Phillips Wheat Special, -----	Greenville Coal & Ice Co., Greenville.	9.13	10.64	10.00
923	Northwestern Dissolved Phosphate and Potash.	H. L. Lindner, Milton, R. D. 1.			
798		Donaldson Hardware Co., Beaver.	13.06	10.26	10.00
338	{Northwestern X. X. X. Alkaline Phosphate.	Jefferson Altfather, Berlin, ---			
1561		James Bannen, Turbotville, R. D. 7.	10.05	10.96	10.00
598	Packer's Union Banner Wheat Grower,	Elvin Horne, Perkaskie, -----	12.52	10.42	10.00
1687	Reese's Wheat Special, -----	J. N. Getz Co., Lock Haven, ---	11.30	12.05	12.00
158	{Susquehanna Grain and Grass Producer.	B. F. Jymon, Thompsonstown, ---			
435		Z. J. Peters, Germey Station, ---	10.87	12.56	12.00
115	{Susquehanna High Grade Phosphate and Potash.	S. L. Sheetz, Halifax, -----			
601		Jonas Kunkle, McKeanburg, ---	10.49	10.13	10.00
1249	Sharpless & Carpenter's Soluble Phosphate and Potash.	Joseph Kinaley, Osterburg, ---			
542		Jas. Houghton, St. Joseph, ---	10.95	11.94	12.00
69	{Wheeler's High Grade Phosphate and	Alvin Shugerts, Luthersburg, ---			
955	Potash.				

†Composite sample.

FERTILIZERS.

Acid and Potash.

Acid in 100 Pounds.			Potash in 100 Pounds.				Computed commercial value of 2,000 pounds at Department rating.	Selling price of 2,000 pounds at point of selection.	Sample number.
Insoluble.	Total.		Present as muriate.	Present as sulphate.	Total.				
	Found.	Guaranteed.			Found.	Guaranteed.			
.88	11.17	11.00	9.38		*9.38	10.00	21.71	{ 21.50 20.00 19.00 18.00	6 1501 577 509
.89	13.26	13.00	5.51		5.51	5.00	19.23	{ 18.00 17.00 16.00	1499 357 67 720
1.43	11.30	11.00	3.34		3.34	2.00	15.44	{ 20.00 16.00	908 861
1.06	11.67	11.00	2.24		2.24	2.00	14.71	{ 16.00 15.00	908 861
1.87	13.70	11.00	1.96		1.96	2.00	15.60	{ 16.00 15.00	908 861
.47	11.18	11.00	2.12		2.12	2.00	14.43	{ 15.00 14.00	1584 514 967
.91	11.52	11.00	2.39		2.39	2.00	14.80	{ 13.50 15.00	1554 1915 1553
1.57	12.01	11.00	1.96		1.96	2.00	14.48	{ 15.00 18.00 15.50	378 78 879
.83	12.62	12.00	1.96		1.96	2.00	15.18	{ 15.00 15.00	227 1781 992
1.23	11.20	11.00	2.43		2.43	2.00	14.56	{ 13.50 20.00 13.40	1042 899 300 923
.38	9.09	9.00	4.93		4.93	5.00	15.88	{ 14.00 15.00	798 338 1581 598
1.39	11.73	11.00	2.56		2.56	2.00	15.00	{ 16.00 15.00 15.50 21.00 17.00	1687 158 435 115 601 1249
.82	11.30	11.00	2.24		2.24	2.00	14.54	{ 16.00 15.00 15.50 21.00 17.00	549 69 855
.50	9.40	9.00	5.42		5.42	5.00	16.47	{ 19.00 21.00 19.00	
1.12	11.47	11.00	2.32		2.32	2.00	14.60		
2.17	12.81	11.00	2.30		2.30	2.00	15.20		
.83	11.09	11.00	5.04		5.04	5.00	17.24		
.83	11.79	11.00	2.31		2.31	2.00	14.96		
1.23	11.70	11.00	2.18		2.18	2.00	14.60		
1.26	13.30	13.00	3.24		3.24	3.00	16.84		
.88	13.44	13.00	4.98		4.98	5.00	18.86		
.87	11.00	11.00	3.81		3.81	2.00	13.46		
1.40	13.34	13.00	5.11		5.11	5.00	18.73		

*Constituent falls below guaranty.

ROCK AND POTASH

Sample number.	Manufacturer and Brand.	From Whom Sample Was Taken.	Moisture in 100 pounds.	Phosphoric	
				Available	
				Found.	Guaranteed.
148 52 535	{Wheeler's Wheat and Clover Fertilizer	J. A. Gummo, Millhall, R. D. 1. H. B. Chaffee, Pottersville, --- L. R. Over, Loysburg, --- G. E. Corl, State College, --- McConnell & Luther, Kittanning.	10.74	10.57	10.00
27 1922		{Williams & Clark's Dissolved Phosphate and Potash.	12.65	10.42	10.00
36 1760		{Zell's Electric Phosphate, -----	W. V. Shirk, Oakland Mills, --- James Blair, Neffs Mills, -----	10.60	10.76
AMERICAN FERTILIZER CO., BALTIMORE, MD.					
28 898	{American Formula Wheat and Corn,	J. H. Neidigh & Son, State College. Jones Eavenson, Christiansa, --- J. H. Neidigh & Son, State College.	10.00	10.53	10.00
26 896		{Dissolved Phosphate and Potash, ---	Jones Eavenson, Christiansa, --- J. W. Blattfelter, Ropsville, --- J. H. Neidigh & Son, State College.	8.50 8.45	9.53 8.39
1474	American Special Potash Mixture, ---				
29 1471	{American Special Super Phosphate, ---	Lauer & Fissel, Dover, -----	9.71	8.44	6.00
ATLANTIC FERTILIZER CO., BALTIMORE, MD.					
603	Atlantic High Grade Potash Compound.	J. O. Lebo, Millersburg, -----	9.64	12.05	12.00
ARMOUR FERTILIZER WORKS, BALTIMORE, MD.					
507	{Banner Brand, -----	E. E. Tribby, West Middlesex, Windham Farmers' Club, Nichols, N. Y. Heebner, Hoover & Co., Du Bois.	8.35	10.01	10.00
51 848 1325 712 1021		{Potash Mixture, -----	Albee & Seltz, Port Allegany, --- B. W. Fetzner, Brookville, --- P. M. Kaster, Rimmersburg, --- Peffer & Son, Punxsutawney, --- J. I. Yetter, Saylorsburg, --- J. G. Walker & Sons Co., Gap	6.11 7.34	6.32 9.30
681 672 909	{Sure Crop, -----				
BALTIMORE FERTILIZER CO., BALTIMORE, MD.					
87	Honest 8 and 3, -----	J. N. Leightner & Son, Gettysburg.	8.73	8.39	8.00
BAUGH & SONS CO., PHILADELPHIA, PA.					
156	{Baugh's High Grade Potash Mixture,	E. H. Hays, Lamar, ----- H. D. & Z. F. Breen, Gettysburg.	8.60	10.29	10.00
101 187 189			E. H. Kean & Co., Parkersburg. E. H. Kean & Co., Parkersburg.		
153 493	{Baugh's Soluble Alkaline Super Phosphate.	E. H. Hays, Tylersville, ----- A. K. Mohr, Coopersburg, ---	7.47	10.02	10.00

†Composite sample.

FERTILIZERS—Continued.

Acid in 100 Pounds.			Potash in 100 Pounds.				Computed commercial value of 2,000 pounds at Department rating.	Selling price of 2,000 pounds at point of selection.	Sample number.
Insoluble.	Total.		Present as muriate.	Present as sulphate.	Total.				
	Found.	Guaranteed.			Found.	Guaranteed.			
1.12	11.69	11.00	2.27	-----	2.27	2.00	14.72	15.00 †16.00 15.50	148 52 535
.51	10.93	11.00	2.17	-----	2.17	2.00	14.30	†14.80 20.00	27 1922
.62	11.38	11.00	2.30	-----	2.30	2.00	14.73	†14.50 20.00	36 1760
1.16	11.69	11.00	5.37	-----	5.37	5.00	17.88	†16.00 16.00	29 899
1.10	11.03	11.00	2.04	-----	2.04	2.00	14.05	†14.00 13.00	26 896
1.21	9.60	9.00	4.18	-----	4.18	4.00	15.16	16.00	1474
.92	9.36	7.00	3.19	-----	3.19	3.00	14.07	†13.50 14.00	29 1471
2.09	14.14	13.00	4.94	-----	4.94	5.00	18.88	17.25	603
.61	10.62	10.50	8.08	-----	8.08	8.00	20.08	24.00 †18.50	567 51
.41	6.73	6.50	3.15	-----	3.15	3.00	12.30	24.00 16.00 †15.00 17.00 20.00	848 1325 712 1621 681
.99	10.29	8.50	4.26	-----	*4.26	5.00	15.79	†15.00 16.00	672 909
.97	9.36	9.00	3.04	-----	3.04	3.00	13.90	16.00	87
1.05	11.34	-----	4.46	-----	4.46	4.00	16.73	17.65 †17.00 16.00 14.00	159 101 197 189
1.75	12.87	-----	2.43	-----	2.43	2.00	15.16	†16.80 17.00	166 496

*Constituent falls below guaranty.

ROCK AND POTASH

Sample number.	Manufacturer and Brand,	From Whom Sample Was Taken.	Moisture in 100 pounds.	Phosphoric	
				Available	
				Found.	Guaranteed.
BOWKER FERTILIZER CO., NEW YORK CITY.					
968	†Bowker's Empire State Phosphate and Potash.	Peter Welser, Sunbury, R. D. 3	8.76	9.15	8.00
134		J. M. McDowell, Woodland, ..			
1094		Kernochan, Titusville, ..			
1425	†Bowker's Golden Harvest Fertilizer.	Robt. Smith, Spring Mills, ..	9.73	12.44	12.00
1549		Geo. N. Strack, Mt. Zion, ..			
654		A. C. Snyder, Bangor, ..			
301	†Bowker's Super Phosphate with Potash.	N. D. Yoder, Higgins, ..	11.99	10.18	10.00
1232		Murray Co., Honesdale, ..			
496		Geo. Maurer, Pitman, ..			
	Bowker's Super Phosphate with Potash for Grass and Grain.		11.85	10.38	10.00
BUFFALO FERTILIZER CO., THE, BUFFALO, N. Y.					
842	†Extra Phosphate and Potash, ...	E. H. Harman, DuBois, ...	12.06	10.04	10.00
200		E. A. Dane, Chicago, ...			
926		Asa McDonald, Greenville, ..			
584	†General Crop, ...	M. Gillis, Hughesville, ..	9.64	8.91	9.00
56		C. Werkhelzer, Pottersville, ..			
701		Reynoldsville Hardware Co., Reynoldsville.			
CENTRAL CHEMICAL CO., THE, HAGERSTOWN, MD.					
1061	†O. C. C. Majestic, ...	John K. Bidler & Son, Oakville.	7.62	9.39	8.00
1478		D. W. Foust & Son, Chambersburg.			
1477		D. W. Foust & Son, Chambersburg.			
COE-MORTIMER CO., THE, NEW YORK, N. Y.					
239	†E. Frank Coe's High Grade Dissolved Phosphate and Potash.	T. F. Kinsman, Hellertown, ..	6.94	*7.53	8.00
1261		A. H. Cobleigh, Alderson, ..			
JOSIAH COPE & CO., BALTIMORE, MD.					
546	†Cope's Soluble Phosphate and Potash	W. H. Beaver, Schellsburg, ..	11.36	10.76	10.00
892		Jones Eavenson, Christiana, ..			
893		Jones Eavenson, Christiana, ..			
676	†Cope's High Grade Phosphate and Potash.	Geo. Ehret, Coal Hill, ..	9.77	10.49	10.00
1414		M. H. Grove, Bellefonte, ..			
EUREKA FERTILIZER CO., PERRYVILLE, MD.					
512	Alkaline No. 2, ...	Jonas P. Acker, Breinigsville, ..	12.32	10.57	10.00
438	†Alkaline No. 8, ...	D. B. Dumm, Thompsonstown, ..	7.51	8.92	8.00
616	Crop Grower, ...	L. Arnold, Elizabethville, ..	5.34	7.50	6.00
836		A. N. Witter, Waterfall, ..			
FARMERS FERTILIZER WORKS, ELIZABETHTOWN, PA.					
24	Farmer's Economy, ...	W. V. Shirk, Oakland Mills, ..	8.91	10.14	10.00

†Composite sample.

FERTILIZERS—Continued.

Acid in 100 Pounds.			Potash in 100 Pounds.				Computed commercial value of 2,000 pounds at Department rating.	Selling price of 2,000 pounds at point of selection.	Sample number.
Insoluble.	Total.		Present as muriate.	Present as sulphate.	Total.				
	Found.	Guaranteed.			Found.	Guaranteed.			
1.11	10.26	9.00	3.66	-----	3.66	3.00	15.10	{ 15.00 +17.00	962 131
1.42	13.86	13.00	4.99	-----	4.99	5.00	18.97	{ 20.00 +20.50	1094 1425 1549
1.06	11.23	11.00	1.69	-----	1.69	1.00	13.87	{ 15.20 14.50	654 301
1.49	11.87	11.00	2.16	-----	2.16	2.00	14.59	{ 16.20 16.00	1232 486
1.06	11.12	11.00	7.44	-----	*7.44	8.00	19.59	{ 22.00 +21.00 23.00	842 200 928
1.02	9.93	10.00	3.80	-----	3.80	3.00	15.07	{ 16.00 +16.50 18.00	584 56 701
.83	9.72	9.00	5.80	-----	5.80	5.00	17.22	{ +16.50 15.00	1051 1478
.82	11.77	11.00	2.71	-----	*2.71	4.00	15.33	{ 15.50	1477
.77	*8.30	9.00	5.32	-----	5.32	5.00	15.52	{ +15.00 15.25	239 1261
.64	11.40	11.00	2.26	-----	2.26	2.00	14.67	{ +14.10 14.00 17.00	546 392 893
1.11	11.60	11.00	5.53	-----	5.53	5.00	18.02	{ +22.00 16.00	676 1414
1.85	12.42	11.00	2.24	-----	2.24	2.00	14.96	{ 16.00	512
1.16	10.08	9.00	6.25	-----	*6.25	8.00	17.64	{ ----- 20.00 26.00	438 616 886
.86	8.35	7.00	2.45	-----	*2.45	3.00	12.61		
1.34	11.48	-----	2.22	-----	2.22	2.00	14.44	15.00	34

*Constituent falls below guaranty.

ROCK AND POTASH

Sample number.	Manufacturer and Brand.	From Whom Sample Was Taken.	Moisture in 100 pounds.	Phosphoric	
				Available	
				Found.	Guaranteed.
1009	W. S. FARMER & CO., BALTI-MORE, MD.	J. A. Eichman, Globe Mills, -	12.25	10.62	10.00
1578	†W. S. Farmer's B. & P. Phosphate,	P. J. Cover & Son, Meyersdale			
749	GRIFFITH & BOYD CO., BALTI-MORE, MD.	W. O. Herr, Strasburg, -----			
102	†Special Grain Grower, -----	H. J. VanDyke, Gettysburg, -	10.41	10.45	10.00
806		Hartley & Blain, Curbottsville			
484		W. H. Kauffman, Mexico, ---			
386	†X. X. Potash Manure, -----	John Artley, Muncy, -----	10.70	8.87	10.00
1450		J. O. Leib & Co., Stewartstown.			
452	S. M. HESS & BRO., INC., PHILA-DELPHIA, PA.	J. R. Iddings, Mifflinburg, ---	8.74	10.19	10.00
935	†Farmers Grain and Clover Grower,---	Cambridge Springs Supply Co., Cambridge.			
453		J. R. Iddings, Mifflinburg, ---			
252	†Soluble Phosphate and Potash, ---	T. S. Manning, Middletown, ---	10.20	10.23	10.00
491		Daniel Kimmer, Mabel, -----			
467	†Standard Alkaline, -----	Thomas E. Spangler, Vicksburg.	7.72	8.91	8.00
669		J. Wernhart, Saylorsburg, ---			
605	Emperor Phosphate, -----	Harvey Smeltzer, Millersburg,--	9.58	10.72	10.00
1461	HUBBARD FERTILIZER CO., THE, BALTIMORE, MD.	D. G. Trout, Stewartstown, -	7.86	7.75	6.00
1588	†Hubbard's Corn and Buckwheat, ---	S. B. Alcott, Ursina, -----			
162		W. A. Esenwine, Salona, -----			
109	†Hubbard's Special Mixture, -----	Biglerville Warehouse Co., Biglerville.	11.20	10.47	10.00
611		J. A. Romberger, Elizabethville.			
214	JARECKI CHEMICAL CO., SANDUSKY, OHIO.	S. P. Marsh, Ten Mile Bottom,	8.60	8.06	8.00
1866	Black Soil Special, -----				
1750	KEYSTONE BONE FERTILIZER CO., THE, PHILADELPHIA, PA.	O. E. Rauscher, Blossburg, --	9.30	8.63	8.00
320	†Keystone 8 and 5, -----	L. A. Geiger, Joanna, -----	8.20	9.93	10.00
77	Keystone 10 and 2, -----	W. S. Weaver, Easton, -----			
757	LANCASTER CHEMICAL CO., THE, LANCASTER, PA.	Amos F. Bushy, York Springs,	10.20	9.29	10.00
350	†No. 13 Special Potash Manure, -----	A. L. Herr, Parryville, -----			
235	LISTER AGRICULTURAL CHEMICAL WORKS, NEWARK, N. J.	D. E. Gamble, Monongahela,	10.60	9.94	10.00
499	†Lister's Dissolved Phosphate and Potash.	Sylvester Gair, Easton, -----			
306		R. D. Sames, Coopersburg, ---	11.10	9.66	9.00
1417	†Lister's Grain and Grass Fertilizer, -	J. O. Boyer, Klingersstown, ---	8.88	8.69	8.00
498		John Dale, Bellefonte, R. D.,			
987	†Lister's 10 Per Cent. Alkaline Potato Fertilizer.	R. D. Sames, Coopersburg, ---			
		B. F. Dock, Winfield, -----			

†Composite sample.

FERTILIZERS—Continued.

Acid in 100 Pounds.			Potash in 100 Pounds.				Computed commercial value of 2,000 pounds at Department rating.	Selling price of 2,000 pounds at point of selection.	Sample number.
Insoluble.	Total.		Present as muriate.	Present as sulphate.	Total.				
	Found.	Guaranteed.			Found.	Guaranteed.			
.56	11.18	11.00	2.38	-----	2.38	2.00	14.72	{ 14.20 18.00	1009 1578
2.13	12.58	11.00	2.70	-----	2.70	2.00	15.46	{ 15.00 15.00 14.50 16.00 18.00	749 102 806 434 336
3.05	11.92	11.00	5.48	-----	5.48	5.00	17.49	{ 16.00	1450
1.47	11.66	11.00	8.27	-----	8.27	8.00	20.66	{ 19.75 24.00 14.75 15.00 18.00	458 985 453 252 491
.92	11.15	11.00	2.48	-----	2.48	2.00	14.66	{ 16.00 17.00 14.50	467 669 605
1.08	9.99	9.00	4.65	-----	*4.65	5.00	15.94	{ 16.00 17.00 14.50	467 669 605
.97	11.69	11.00	1.24	-----	1.24	1.00	13.76	{ 16.00 17.00 14.50	467 669 605
1.35	9.10	7.50	3.61	-----	3.61	3.00	14.14	{ 16.00 17.00 18.00	1461 1588 162
1.80	*11.77	12.00	4.42	-----	4.42	4.00	16.88	{ 16.00 16.00	109 611
.87	8.90	9.00	7.44	-----	*7.44	8.00	18.10	30.00	214
1.01	9.64	9.00	4.92	-----	4.92	5.00	15.99	{ 19.00	1396
1.05	10.98	11.00	1.97	-----	1.97	2.00	13.94	{ 18.00	1750 220
2.58	11.87	11.00	4.83	-----	4.83	5.00	16.98	{ 16.00	77 757
.83	*10.77	11.00	2.36	-----	2.36	2.00	14.28	{ 23.00 16.00 18.00	350 235 499
.59	10.25	10.00	5.07	-----	5.07	5.00	16.71	{ 16.25 15.25 123.00 19.25	306 1417 498 987
.76	9.45	9.00	10.79	-----	10.79	10.00	21.96	{ 19.25	

*Constituent falls below guaranty.

ROCK AND POTASH

Sample number.	Manufacturer and Brand.	From Whom Sample Was Taken.	Moisture in 100 pounds.	Phosphoric	
				Available	
				Found.	Guaranteed.
746	FREDERICK LUDLAM CO., THE BALTIMORE, MD. Ludham's Cecrops Fertilizers, I. X. L. Brand.	Wm. J. Hess, Quarryville, ----	9.40	8.68	8.00
	D. B. MARTIN CO., PHILADELPHIA, PA.				
449	†Martin's Potash and Soluble Phosphate, 6-8.	Samuel K. Strickler, Mifflinburg.	8.75	7.10	6.00
1193	†Martin's Potash and Soluble Phosphate, 8-5.	A. P. Lippy, Littlestown, ---	12.37	9.67	8.00
1019	†Martin's Potash and Soluble Phosphate, 10-2.	T. J. Morner, Lewistown, ---	11.97	10.29	10.00
450	†Martin's Potash and Soluble Phosphate, 12-3.	Samuel K. Strickler, Mifflinburg.	13.88	11.87	12.00
662	†Martin's Potash and Soluble Phosphate, 12-5.	E. J. Houck, Bangor, --- John Zimmerman, Millersburg, --- H. Cooke & Co., Dillsburg, --- Samuel K. Strickler, Mifflinburg.	11.86	*11.68	12.00
606	†Martin's Potash and Soluble Phosphate, 12-5.	J. P. Stoltzfus, Elverson, ---			
1165	MILLER FERTILIZER CO., BALTIMORE, MD.				
943	†Cinch Phosphate, -----	Chas. Huston, Three Springs, ---	8.34	10.37	10.00
468	†Miller's Potash Mixture, -----	Peter Hause, New Columbia, ---	9.11	9.86	10.00
1190	Special Alkaline, -----	Chas. G. Carbaugh, Hanover, --- D. A. Robinson, Fort Royal, --- A. D. Browne, East Berlin, --- N. G. Adams, Elysburg, ---	7.09	8.24	8.00
48	NASSAU FERTILIZER CO., NEW YORK CITY, N. Y.				
1170	†Grass and Grain Fertilizer, -----	A. M. McClure, Everett, ----- J. T. Foulk & Co., Houtzdale.	9.15	10.64	10.00
961	†Royal Mixture, -----	Harvey M. Walters, Kratzville J. T. Sanders, Mifflinburg, --- Matt Griffith, Montrose, ----- A. M. McClure, Everett, ----- C. T. Krape, Nittany, ----- Matt Griffith, St. Joseph, ----- John D. Graybill & Sons, Bellville.	8.19	8.47	8.00
821	†Ten and Eight Special, -----		9.39	10.25	10.00
385	PATAPSCO GUANO CO., BALTIMORE, MD.				
98	Patapasco Alkaline Plant Food, -----	F. C. Thomas, Gettysburg, ---	9.56	8.63	8.00
1552	†Patapasco Phospho Potash, -----	H. F. Zehring, Liverpool, --- E. C. Thomas, Gettysburg, --- Jacob Fritz, New Bloomfield, ---	7.81	6.47	6.00
91	J. D. PERKINS, COATESVILLE, PA.				
1794	Perkins Globe Phosphate, -----	Edward Tringley, Kelton, ----	11.84	9.90	10.00
178	PIEDMONT MT. AIRY GUANO CO., BALTIMORE, MD.				
76	Leverings I. X. L. Crop Grower, -----	D. S. Stitzel, York Springs, ---	7.29	10.02	10.00
56	Piedmont Soluble Phosphate and Potash.	H. D. & J. F. Bream, Gettysburg.	6.50	8.94	8.00

†Composite sample.

FERTILIZERS—Continued.

Acid in 100 Pounds.			Potash in 100 Pounds.				Computed commercial value of 2,000 pounds at Department rating.	Selling price of 2,000 pounds at point of selection.	Sample number.
Insoluble.	Total.		Present as muriate.	Present as sulphate.	Total.				
	Found.	Guaranteed.			Found.	Guaranteed.			
.82	9.50	9.00	4.90		4.99	5.00	16.06	16.00	746
.57	7.07		3.80		3.30	3.00	13.09	{ 111.98 15.00	449 1193
.84	10.51		4.54		*4.54	5.00	16.27	{ 116.00 17.00	222 1019
.83	11.12		2.10		2.10	2.00	14.24	{ 112.98 13.50	450 652
.83	12.70		3.01		3.01	3.00	16.30	{ 115.00 16.50	606 1165
.57	12.25		5.46		5.46	5.00	18.58	{ 115.98 18.00	451 1144
.70	11.07	10.50	2.50		2.50	2.00	14.76	{ 15.00 116.00 14.40	913 408 1193
.80	10.06	10.50	5.71		5.71	5.00	17.60	{ 15.75 18.00	48 1170
.61	8.86	8.50	4.87		4.87	5.00	15.56	{ 18.00	961
.66	11.30	11.00	2.71		2.71	2.00	15.07	{ 15.00 121.00	821 385
.61	9.08	9.00	6.33		6.33	5.00	17.18	{ 15.50 116.00 18.00	990 457 411 823
.74	10.99	11.00	8.07		8.07	8.00	20.26	{ 122.75 21.00	154 68 1026
.77	9.40	9.00	4.95		4.96	5.00	15.96	{ 15.50 13.75	88 1552
1.15	7.02	7.00	1.89	1.16	3.05	3.00	12.79	{ 14.00 15.00	91 1794
1.10	11.00		2.23		2.23	2.00	14.22	17.00	173
1.08	11.05		2.62		*2.62	3.00	14.64	14.75	76
.94	9.88		1.73		*1.73	2.00	12.98	15.50	96

*Constituent falls below guaranty.

ROCK AND POTASH

Sample number.	Manufacturer and Brand.	From Whom Sample Was Taken.	Moisture in 100 pounds.	Phosphoric	
				Available	
				Pound.	Guaranteed.
	POLLOCK FERTILIZER CO., THE, BALTIMORE, MD., BY A. A. C. CO., N. Y.				
441	†Pollock's Sun Guano, -----	W. H. Selver, McAllsterville,--	9.01	10.57	10.00
1044		J. D. Garman, Shippensburg,--			
	RASIN MONUMENTAL CO., BALTI- MORE, MD.				
840	†Rasin's Phosphate and Potash, ---	H. E. Huston, Saltville, -----	8.82	10.22	10.00
582		H. J. Deal, Bedford, -----			
1200		J. D. Markle, Hanover, -----			
1006	†Rasin's Wheat and Truck Mixture, -	A. D. Kramer, Kramer, -----	9.92	10.26	10.00
117		Aspers Milling & Produce Co., Bendersville Station, -----			
1547		A. G. Houtz, Truckville, ----			
	ROBERT A. REICHARD, ALLEN- TOWN, PA.				
1800	Farmer's Favorite, -----	R. S. Kemmerer, Bowmans, --	8.71	8.26	8.00
	F. S. ROYSTER GUANO CO., BAL- TIMORE, MD.				
1971	†High Grade Potash Mixture, -----	Preston Bros., Troy, Pa.,----	5.51	10.89	10.00
21		E. R. Behny, Snedburg, -----			
18	†Peerless Grain and Grass Grower, --	E. R. Behny, Snedburg, -----	6.81	10.56	10.00
1048		J. S. Craig, Shippensburg, ----			
880	†Royster's Alkaline Phosphate, -----	A. W. Sandt, Martins Creek, ----	5.56	6.17	6.00
1845		N. O. Creasy, Catawissa, -----			
108	†Royster's Bumper Crop Phosphate,--	E. E. Heckman, Salona, -----	6.29	8.08	8.00
1021		M. K. Stoltzfus, Bellville, ----			
1966	†Royster's Special Fruit and Crop Grower, -----	Heffner & Savidge, Kutztown,--	9.51	10.28	10.00
874	Royster's Standard Crop Phosphate,--	L. F. Marcy, Monroetown, ----	8.35	9.69	9.00
414	†Royster's Superior Potash Mixture,--	B. O. Tourgee, New Milford,--	11.76	12.45	12.00
1148		John B. McGowan, Elverson, ----			
1178		John W. King, East Berlin, ----			
166	†Royster's X. X. X. Alkaline Phos- phate, -----	F. E. Heckman, Salona, -----	7.08	9.89	10.00
1784		L. K. Gruber, Reynolds, -----			
	SCOTT FERTILIZER CO., THE, ELKTON, MD.				
787	†Scott's Tip Top and Potash, -----	S. Book & Bros., Quarryville,--	11.76	*9.80	10.00
1078		Elias Brubacker, Richland, ----			
	SOUTHERN FERTILIZER CO., YORK, PA., BY A. A. C. Co., N. Y.				
507	Special Brand for All Crops, -----	Bastian & Romig, Wescoville,--	11.00	11.50	10.00
	STEININGER BROS., MIDDLEBURG, PA., BY A. A. C. CO., THE, N. Y.				
444	Grain and Grass, -----	Steininger Bros., Middleburg, -	8.94	*5.47	6.00
445	Special Mixture, -----	Steininger Bros., Middleburg, -	7.45	*5.11	6.00

†Composite sample.

FERTILIZERS—Continued.

Acid in 100 Pounds.			Potash in 100 Pounds.				Computed commercial value of 2,000 pounds at Department rating.	Selling price of 2,000 pounds at point of selection.	Sample number.
Insoluble.	Total.		Present as muriate.	present as sulphate.	Total.				
	Found.	Guaranteed.			Found.	Guaranteed.			
.92	11.49	11.00	5.95	-----	5.95	6.00	18.43	{ 18.50 19.50	441 1044
1.47	11.69	11.00	2.49	-----	2.49	2.00	14.84	{ 17.00 15.00 14.50 19.00	840 582 1200 1006
1.53	11.79	11.00	8.22	-----	8.22	8.00	20.71	{ 20.00 20.00	117 1547
1.01	9.27	9.00	4.86	-----	4.86	5.00	15.64	18.00	1860
.70	11.29	11.00	10.68	-----	10.68	10.00	23.20	{ 125.00 16.00 16.00	1971 21 18
.63	11.19	11.00	2.35	-----	2.35	2.00	14.65	{ 16.00 1045	1045
.45	*6.62	7.00	3.19	-----	3.19	3.00	12.26	{ 13.00 15.00	380 1345
.48	*8.56	9.00	5.28	-----	5.28	5.00	15.82	{ 15.20 16.75 20.00	168 1021 1968
.70	10.98	11.00	*7.79	-----	*7.79	8.00	20.02	20.00	1968
.69	10.28	10.00	4.95	-----	4.95	5.00	16.49	18.00	874
.13	*12.58	18.00	5.24	-----	5.24	5.00	18.78	{ 20.00 18.00 16.50 17.00 18.00	414 1143 1178 165 1734
.62	*10.51	11.00	5.26	-----	5.26	5.00	17.10	{ 17.00 18.00	165 1734
1.50	11.80	-----	2.31	-----	2.31	2.00	14.35	{ 14.00 15.50	737 1078
1.08	12.58	11.00	5.62	-----	*5.62	6.00	18.79	16.60	507
.61	*6.08	7.00	2.94	-----	2.94	3.00	11.59	15.00	444
.45	*5.58	7.00	2.78	-----	*2.78	3.00	11.10	13.00	444

*Constituent falls below guaranty.

ROCK AND POTASH

Sample number.	Manufacturer and Brand.	From Whom Sample Was Taken.	Moisture in 100 pounds.	Phosphoric		
				Available		
				Found.	Guaranteed.	
1779	SWIFT & CO., CHICAGO, ILL.					
1098	Swift's Pure Diamond G. Fertilizer, -	Iseman Carriage Co., Clarion,	12.82	11.85	10.00	
	Swift's Pure High Grade Phosphate	J. H. Rickembrode, Hydetown,	10.41	10.30	10.00	
	and Potash.					
1400	Swift's Pure Special Phosphate and	Charles Beckman, Fairview. --	9.34	10.64	10.00	
	Potash.					
	D. A. THOMAS & CO., HAGERS-					
	TOWN, MD.					
1488	Potash Special, -----	J. A. Witherspoon, Mercers-	7.61	12.84	12.00	
		burg.				
	I. P. THOMAS & SONS CO., PHILA-					
	DELPHIA, PA.					
60	Special Alkaline Fertilizer, -----	F. E. Van Orinald, Lerays-	9.59	10.89	10.00	
		ville.				
489	†Special Corn Fertilizer, -----	C. H. Kestler, Mabel, -----	9.85	10.13	10.00	
62		F. E. Van Orinald, LeRays-				
		ville.				
920	†Thomas' Square Deal Phosphate, --	Wm. J. Moyer, Greenville, ---	8.08	9.28	9.00	
61		F. E. Van Orinald, Le Rays-				
		ville.				
191		Mulholland & Dale, Morton-				
		ville.				
	JAMES THOMAS, WILLIAMSPORT,					
	PA.					
1822	†Thomas' Dissolved Alkaline Phos-	Coryell & Russ Co., St.	11.47	11.87	10.00	
887		Marys.				
		F. E. Shoemaker, Granville				
	phate.	Summit.				
1774		McEwen Hardware Co., New				
		Bethlehem.				
	F. W. TUNNELL & CO., INC.,					
	PHILADELPHIA, PA.					
219	Gehmans Special, -----	W. S. Weaver, Easton, ----	12.17	13.05	13.00	
	TUSCARORA FERTILIZER CO.,					
	BALTIMORE, MD.					
671	Alkaline, -----	J. I. Yetter, Saylorsburg, ---	9.65	10.16	10.00	
	J. E. TYGERT & CO., THE, PHILA-					
	DELPHIA, BY A. A. O. CO.,					
	THE, N. Y.					
187	†Tygert's Soluble Phosphate and Pot-	Jacob Hummel, Bigler, -----	10.72	10.52	10.00	
5		Robert Schaffer, Rock, -----				
		Sykesville Hardware, Sykes-				
668	ash.	ville.				
	UNITED STATES FERTILIZER CO.,					
	THE, BALTIMORE, MD.					
581	†Farm Bell Alkaline Mixture, -----	M. Gills, Hughesville, -----	7.21	9.43	9.40	
1015		W. B. Whinnery, Middleburg,]				
1014	†Farm Bell Phosphate and Potash, --	W. B. Whinnery, Middleburg,]	6.33	9.43	8.00	
582		M. Gills, Hughesville, -----				
1181		J. C. Birely, New Oxford, ---]				
1179	Farm Bell Phospho Potassa, -----	J. C. Birely, New Oxford, ---	9.28	13.09	12.00	

†Composite sample.

FERTILIZERS—Continued.

Acid in 100 Pounds.			Potash in 100 Pounds.				Computed commercial value of 2,000 pounds at Department rating.	Selling price of 2,000 pounds at point of selection.	Sample number.
Insoluble.	Total.		Present as muriate.	present as sulphate.	Total.				
	Found.	Guaranteed.			Found.	Guaranteed.			
.87	11.72	11.00	4.93	1.17	*8.10	8.00	19.14	23.00	1779
.26	*10.56	11.00	3.54		*3.54	4.00	15.54	22.00	1008
.61	11.25	11.00	1.78		*1.78	2.00	14.12	17.25	1400
.48	13.27	13.00	5.53		5.53	5.00	19.46	18.00	1488
.61	10.94	11.00	4.16		4.16	4.00	16.30		60
.92	11.05	11.00	4.06		*4.06	6.50	16.77	{ 21.00	489
								{ 22.00	920
.80	10.17	10.00	3.52		3.52	3.00	15.00	{ 14.00	61
									191
.98	12.80	11.00	2.26		2.26	2.00	15.57	{ 19.00	1322
								{ 15.00	867
								{ 20.00	1774
.89	13.94	14.00	5.10		*5.10	6.00	19.33	23.00	219
.45	10.61	10.50	4.83		4.83	5.00	16.82	16.50	671
.85	11.87	11.00	2.28		2.28	2.00	14.62	{ 17.00	137
								{ 16.00	5
								{ 20.00	698
.65	*10.09	10.40	2.71		2.71	2.00	14.20	{ 15.00	581
								{ 14.50	1015
.41	9.84	9.00	4.98		4.98	5.00	16.45	{ 16.50	1011
								{ 16.00	582
.80	13.39	13.00	5.77		5.77	5.00	19.81	{ 16.00	1181
								{ 18.00	1179

*Constituent falls below guaranty.

ROCK AND POTASH

Sample number.	Manufacturer and Brand.	From Whom Sample Was Taken.	Phosphoric		
			Available		
			Moisture in 100 pounds.	Found.	Guaranteed.
	VIRGINIA'S CAROLINA CHEMICAL CO., FOR RESALE BY BASIN MONUMENTAL CO., BALTIMORE, MD.				
480	V. C. O. Co.'s Double Phosphate and Potash.	Isaac Kunkle, Winfield, -----	8.60	9.27	8.00
986	} V. C. O. Co.'s Peerless Phosphate and Potash.	Isaac Kunkle, Winfield, -----	10.25	8.42	8.00
1201		J. D. Markle, Hanover, -----			
716	V. C. O. Co.'s Standard Phosphate and Potash.	N. H. Dainer, Brookville, -----	8.34	10.54	10.00
	F. K. WALT CO., READING, PA.				
298	Walt's Superior Phosphate and Potash	A. D. Super, Schuylkill Haven, -----	9.61	10.44	10.00
	W. E. WHANN CO., PHILADELPHIA, PA., BY A. A. O. CO., THE, N. Y.				
306	Whann's Alkaline Phosphate, -----	S. Ellis Schwalm, Valley View, -----	11.52	10.59	10.00
	ROBERT A. WOOLDRIDGE CO., THE, BALTIMORE, MD.				
478	} Wooldridge's German Potash Mixture.	Dershowe & Bennoge, White Deer, -----	10.21	10.00	10.00
1287		W. B. Kauffman, Auburn, -----			
39	} Wooldridge's Ideal Grain and Grass Producer.	W. V. Shirk, Oakland Mills, -----	10.22	10.93	10.00
1836		Daniel Loch, Andreas, -----			
439	} Wooldridge's No. 2 Phosphate and Potash.	W. V. Shirk, Oakland Mills, -----	9.14	8.80	8.00
1658		R. A. Richards, Mendenhall, -----			
	YORK CHEMICAL WORKS, YORK, PA.				
1204	Dempwolf's Black Cross, -----	Frey & Sheffer, Hanover, -----	8.85	10.08	10.00
373	} Red Cross, -----	G. Eddleman, Seigfred, -----			
372		B. J. Crissman, Curwensville, -----	7.68	10.23	10.00
447	} York Special, -----	Steininger Bros., Middleburg, -----			
376		G. Eddleman, Seigfred, -----			
257		W. H. Rapp, Union Deposit, -----	6.68	8.80	8.00
446		Steininger Bros., Middleburg, -----			

†Composite sample.

FERTILIZERS—Continued.

Acid in 100 Pounds.			Potash in 100 Pounds.				Computed commercial value of 2,000 pounds at Department rating.	Selling price of 2,000 pounds at point of selection.	Sample number.
Insoluble.	Total.		Present as muriate.	present as sulphate.	Total.				
	Found.	Guaranteed.			Found.	Guaranteed.			
.80	10.07	9.00	4.11	-----	4.11	4.00	15.54	14.00	490
.89	9.31	9.00	2.17	-----	2.17	2.00	12.97	{ 13.00	985
1.38	11.92	11.00	2.53	-----	2.53	2.00	15.07	13.75 16.00	1201 716
4.42	14.86	11.50	2.11	-----	2.11	2.00	15.66	17.00	293
1.28	11.87	11.00	2.38	-----	2.38	2.00	14.91	15.00	305
.87	11.47	11.00	2.30	-----	2.30	2.00	14.70	{ 14.00 15.00	473 1267
1.22	12.15	11.00	4.30	-----	4.30	4.00	17.11	{ 16.00	39 1836
.94	9.24	9.00	4.93	-----	4.93	5.00	15.78	{ 16.00 19.00	439 1658
.96	10.99	10.50	2.25	-----	2.25	2.00	14.28	15.00	1204
.79	11.02	10.50	5.29	-----	5.29	5.00	17.48	{ 17.00 17.00 16.00	872 126 447 878
.70	9.00	8.50	4.50	-----	4.50	4.00	15.22	{ 15.00 16.50	267 446

*Constituent falls below guaranty.

ACIDULATED Furnishing

Sample number.	Manufacturer and Brand.	From Whom Sample Was Taken.
AMERICAN AGRICULTURAL CHEMICAL CO., THE, NEW YORK.		
787	†Bradley's Soluble Dissolved Phosphate.	Richard Graves, Jerwyn, ...
356	†Canton Chemical Bakers' Dissolved Phosphate.	Geo. B. Andrews, Enon Valley, ...
805	†Canton Chemical Bakers' Dissolved S. C. Phosphate.	Ell Yost, McEwensville, ...
218	†Canton Chemical Bakers' Dissolved S. C. Phosphate.	W. S. Weaver, Easton, ...
231	†Canton Chemical Bakers' Dissolved S. C. Phosphate.	W. S. Weaver & Son, Easton, ...
1494	†Crocker's Dissolved Phosphate, ...	Greencastle Elevator Co., Greencastle, ...
64	†Maryland Dissolved S. C. Phosphate	J. A. Williams, Friendsville, ...
932	†Milsom's Acid Phosphate, ...	Linesville Coal, Lime & Cement Co., Linesville, ...
961	†Milsom's Dissolved Phosphate, ...	J. A. Gass, Sunbury, B. D., ...
537	†Northwestern Acid Phosphate, ...	L. R. Over, New Enterprise, ...
1913	†Pacific Dissolved Phosphate, ...	Smith & McElvey, Blairsville, ...
883	†Read's Acid Phosphate, ...	Willard Arnold, Granville Center, ...
334	†Reese's Dissolved Phosphate of Lime, Tygert Allen Star Dissolved Phosphate, Quinlplae Soluble Dissolved Phosphate, Sharpless & Carpenter's Acid Phosphate.	John Artley, Muncy, ...
133	†Susquehanna Superior Rock Phosphate, Williams & Clark Acorn Acid Phosphate.	J. W. Eberts & Co., Clearfield, ...
1629	†Wheeler's Peerless Acid Phosphate, ..	E. E. Weeter, Silgo, ...
1582		Jefferson Altfather, Berlin, ...
1383		John Davis, Middleburg Centre, ...
1701		Kemerer Co., Lehigh, ...
689		J. O. Campbell, Big Run, ...
784		David White, Jerwyn, ...
1255		Salem Smith, Orwigsburg, ...
1644		Harry Wilson, Frazer, ...
876		H. A. Cramer & Son, Monroeton, ...
1901		James L. Culp, Indiana, ...
1751		L. A. Geiger, Joanna, ...
1657		R. A. Richards, Mendenhall, ...
1237		W. J. Warwick, Narrowsburg, N. Y., ...
55		H. B. Chaffee, Pottersville, ...
ARMOUR FERTILIZER WORKS, BALTIMORE, MD.		
1326	†Cereal Phosphate, ...	Albee Seltz, Port Allegheny, ...
1421	†Star Phosphate, ...	McCalmont & Co., Bellefonte, ...
910		J. G. Walker & Sons Co., Gap, ...
847		Hibner Hoover & Co., DuBois, ...
1113		Sellers, Hoffman, Chadd's Ford, ...
ATLANTIC FERTILIZER CO., BALTIMORE, MD.		
484	†Atlantic Dissolved Phosphate, ...	Wm. Klock, Pitman, ...
121		E. J. Flynn, Grampian, ...
1586		J. G. Emert, Somerset, ...
BALTIMORE FERTILIZER CO., BALTIMORE, MD.		
86	Honest Acid Phosphate, ...	J. N. Leightner, Gettysburg, ...

†Composite sample.

ROCK PHOSPHATE.

Phosphoric Acid.

Moisture in 100 pounds.	Phosphoric Acid in 100 Pounds.					Computed commercial value of 2,000 pounds at Department rating.	Selling price of 2,000 pounds at point of selection.	Sample number.
	Available.		Insoluble.	Total.				
	Found.	Guaranteed.		Found.	Guaranteed.			
10.34	14.58	14.00	1.35	15.98	15.00	14.20	{ 14.00 16.04 14.00	787
12.11	13.86	14.00	1.28	15.14	15.00	13.64		356
8.38	15.17	14.00	1.19	16.36	15.00	14.64		805
10.24	14.97	14.00	1.76	16.73	15.00	14.64	{ 16.00 14.50 14.50	218
11.01	14.92	14.00	1.08	16.00	15.00	14.32		231
9.72	15.11	14.00	1.56	16.67	15.00	14.64		1494
10.61	12.23	12.00	2.08	14.31	13.00	12.78	{ 16.00 14.00 18.00	64
9.69	15.35	14.00	1.17	16.52	15.00	14.67		932
12.56	14.79	14.00	2.60	17.39	15.00	14.79		961
9.00	14.37	14.00	1.58	15.95	15.00	14.11	{ 14.50 16.00 15.00	537
7.15	14.80	14.00	2.01	16.81	15.00	14.68		1913
10.44	14.96	14.00	1.28	16.23	15.00	14.43		883
12.50	15.04	14.00	1.62	16.66	15.00	14.61	{ 14.00 18.00 15.00	334
8.37	14.88	14.00	1.11	15.94	15.00	14.29		183
10.05	15.06	14.00	.80	15.86	15.00	14.32		1689
9.84	14.97	14.00	1.12	16.09	15.00	14.40	{ 15.50 16.00 12.50	1582
11.69	14.56	14.00	1.25	15.81	15.00	14.13		1383
5.32	10.07	10.00	.38	10.45	10.50	10.68		1701
8.81	14.23	14.00	.57	14.80	14.50	13.66	{ 15.00 16.00 12.75 13.50	689
5.38	15.74	14.00	1.08	16.82	15.00	14.94		784
9.85	15.72	14.00	.93	16.65	15.00	14.85		1255
							{ 12.00 14.50 14.00	1644
								876
								1901
								1751
								1657
								1237
								55
								1826
								1421
								910
								847
								1113
								434
								121
								1586
								86

*Constituent falls below guaranty.

ACIDULATED ROCK

Sample number.	Manufacturer and Brand.	From Whom Sample Was Taken.
	BAUGH & SONS CO., PHILADELPHIA, PA.	
332	†Baugh's High Grade Acid Phosphate,	Herman Keebler, Montoursville, ...
190		E. H. Keen & Co., Parkesburg, ...
662		O. V. Smith, E. Stroudsburg, ...
112		Biglerville Warehouse Co., Biglerville, ...
57	†Baugh's 16 Per Cent. Acid Phosphate	Orwell Club, Orwell, ...
129		Rauch & Swartzel, Clearfield, ...
	BOWKER FERTILIZER CO., NEW YORK, N. Y.	
1426	†Bowker's Soluble Phosphate, ...	Robt. Smith, Spring Mill, ...
964		Peter Welser, Asherton, ...
1511		E. H. Sloan, Orangeville, R. D. 2, ...
	BUFFALO FERTILIZER CO., THE, BUFFALO, N. Y.	
1624	†Dissolved Phosphate, ...	J. P. Wilson, Rimersburg, ...
927		Asa McDonald, Greenville, ...
1890		J. Baker, Carrolltown, ...
	COE-MORTIMER CO., THE, NEW YORK, N. Y.	
774	E. Frank Coe's High Grade Soluble Phosphate.	A. W. Kenyon, Clifford, ...
	EUREKA FERTILIZER CO., PERRYVILLE, PA.	
839	†P. & P. Super Phosphate, ...	A. N. Witter, Waterfall, ...
1656		R. A. Richards, Mendenhall, ...
	W. S. FARMER & CO., BALTIMORE, MD.	
1577	W. S. Farmer Co.'s Dissolved S. C. Phosphate.	P. J. Cover & Sons, Myersdale, ...
	GRIFFITH & BOYD CO., BALTIMORE, MD.	
747	†High Grade Acid Phosphate, ...	W. C. Herr, Strassburg, ...
329		Weaver & Callahan, Montoursville, ...
1904		J. W. Harbison, Indiana, ...
	S. M. HESS & BRO., INC., PHILADELPHIA, PA.	
933	†High Grade Acid Phosphate, ...	Cambridge Springs Supply Co., Cambridge Springs, ...
1893		P. F. Wason, Lovejoy, R. D., ...
	JERECKI CHEMICAL CO., SANDUSKI, OHIO.	
1092	O. O. D. Phosphate, ...	H. B. Edwards & Co., Titusville, ...
	LANCASTER CHEMICAL CO., LANCASTER, PA.	
1761	No. 8 Acid Phosphate, ...	L. W. Miller, Neffs Mills, ...
	LISTER'S AGRICULTURAL CHEMICAL CO., NEWARK, N. J.	
1770	†Lister's Buyers Choice Acid Phosphate.	Jacob Bowser, Osterburg, ...
1919		G. W. Martin & Co., Saltsburg, ...
	F. MEHRING, BRUCEVILLE, MD.	
1187	Acid Phosphate, ...	J. N. Silfer, Littlestown, ...

†Composite sample.

PHOSPHATE—Continued.

Moisture in 100 pounds.	Phosphoric Acid in 100 Pounds.					Computed commercial value of 2,000 pounds at Department rating.	Selling price of 2,000 pounds at point of selection.	Sample number.
	Available.		Insoluble.	Total.				
	Found.	Guaranteed.		Found.	Guaranteed.			
10.21	14.73	14.00	.43	15.16	-----	13.95	{ 14.00 +13.00 19.00 15.50 +13.08 15.00	332 190 622 112 57 129
9.18	16.89	16.00	.74	17.63	-----	15.64		
9.60	14.60	14.00	.93	15.53	15.00	14.06	{ +----- 13.50	1426 964 1511
12.20	14.14	14.00	1.31	15.45	15.00	13.86	{ 16.00 +18.00 16.21	1624 927 1890
8.55	15.15	14.00	1.08	16.23	15.00	14.50	15.00	774
7.19	15.80	14.00	1.86	17.16	15.00	15.07	{ +16.00 15.00	838 1656
11.02	15.11	14.00	.70	15.81	15.00	14.82	17.00	1577
11.36	*13.78	14.00	2.80	16.58	15.00	14.14	{ 13.50 16.00 15.00	747 329 1904
9.99	14.87	14.00	1.64	16.51	15.00	14.49	{ +18.00 15.50	933 1893
9.60	12.28	12.00	1.39	13.67	13.00	12.56	16.00	1092
5.90	*12.10	14.00	5.04	17.14	15.00	13.72	-----	1761
11.00	15.37	14.00	.82	16.19	15.00	14.58	{ +15.80 16.50	1770 1919
9.33	16.74	15.00	3.57	20.31	16.00	16.54	14.00	1187

*Constituent falls below guaranty.

ACIDULATED ROCK

Sample number.	Manufacturer and Brand.		From Whom Sample Was Taken.	
	MILLER FERTILIZER CO., BALTI- MORE, MD.			
807 942	{	Acid Phosphate, -----	{	Hartley & Blain, Turbotsville, -----
				Chas. Huston & Bro., Three Springs, -----
	NASSAU FERTILIZER CO., NEW YORK, N. Y.			
543 155 1596	{	Soluble Phosphate, -----	{	B. F. Corle, Imler, -----
				C. L. Krape, Lemar, -----
				J. Harvey Miller, Ligonier, -----
	G. OBER & SONS CO., BALTIMORE, MD.			
92		Ober's Dissolved Phosphate, -----		D. Blocher & Co., Gettysburg, -----
	PIEDMONT MT. AIRY GUANO CO., BALTIMORE, MD.			
500 118 957	{	Piedmont 14 Per Cent. Acid Phos- phate.	{	M. Gills, Hughesville, -----
				Aspers Milling & Produce Co., Aspers, -----
				John G. Simpson, Huntingdon, -----
	READING BONE FERTILIZER CO., READING, PA.			
1349		14 Per Cent. Acid Phosphate, -----		H. E. Kern, Catawissa, R. D., -----
	F. S. ROYSTER GUANO CO., BAL- TIMORE, MD.			
1505 426 1892 1151 1302	{	14 Per Cent. Acid Phosphate, -----	{	W. J. Hidley, Lightstreet, R. D., -----
				E. C. Rogers, Brooklyn, -----
				D. C. Brittain, Register, -----
				John W. King, York Springs, R. D. 6, -----
				Preston Bros., Troy, -----
	SCHAAL-SHELDON FERTILIZER CO., BUFFALO, N. Y.			
1099		Dissolved Phosphate, -----		Brooklyn Milling Co., Spartansburg, -----
	M. L. SHOEMAKER & CO., PHILA- DELPHIA, PA.			
24 1134	{	Dissolved S. C. Rock, -----	{	A. F. Spittler, Paradise, -----
				J. K. Lewis, Honeybrook, -----
	J. L. & H. STADLER RENDERING & FERTILIZER CO., CLEVELAND, OHIO.			
929		Stadler's Acid Phosphate, -----		McMungle Bros., Jamestown, -----
	SWIFT & CO., CHICAGO, ILL.			
1097		Swift's Pure Garden City Phosphate, -----		J. H. Rickenbrode, Hydestown, -----
	D. A. THOMAS & CO., HAGERS- TOWN, MD.			
1487		Dissolved Phosphate, -----		J. A. Witherspoon, Mercersburg, -----
	JAMES THOMAS, WILLIAMSPORT, PA.			
884		Thomas' Dissolved Florida Phosphate, -----		F. E. Shoemaker, Granville Summit, -----

†Composite sample.

PHOSPHATE—Continued.

Moisture in 100 pounds.	Phosphoric Acid in 100 Pounds.					Computed commercial value of 2,000 pounds at Department rating.	Selling price of 2,000 pounds at point of selection.	Sample number.
	Available.			Total.				
	Found.	Guaranteed.	Insoluble.	Found.	Guaranteed.			
7.56	14.56	14.00	1.57	16.13	14.50	14.25	{ 14.00 14.50	807 942
10.83	14.79	14.00	1.08	15.87	15.00	14.25	{ ----- 15.20 17.00	548 155 1506
7.72	14.96	14.00	.24	15.20	15.00	14.06	14.00	92
9.37	14.18	14.00	.34	14.52	-----	13.52	{ 14.50 15.00 14.00	500 118 967
4.34	14.53	14.00	.87	15.40	15.00	13.99	14.00	1349
7.84	15.02	14.00	.35	15.37	15.00	14.13	{ ----- 18.00 14.00	1505 428
8.23	17.63	16.00	.39	18.02	17.00	16.02	{ 14.00 15.00 17.00	1802 1151 1302
9.88	15.33	14.00	1.65	16.98	15.00	14.85	18.00	1099
8.18	14.97	14.00	.48	15.45	15.00	14.14	{ 14.50 15.00	24 1134
5.10	15.02	14.00	2.84	17.86	15.00	15.03	15.00	929
10.56	14.47	14.00	.63	15.10	15.00	13.84	18.00	1097
5.37	13.92	14.00	1.36	15.28	15.00	13.68	13.00	1487
7.13	*11.80	12.00	.88	*12.68	14.00	12.02	14.00	884

*Constituent falls below guaranty.

ACIDULATED ROCK

Sample number.	Manufacturer and Brand.	From Whom Sample Was Taken.
392 697 128	J. E. TYGERT & CO., PHILADEL- PHIA, PA., BY A. A. O. CO., THE, N. Y. †Acid Phosphate, ----- Tygert's Dissolved Phosphate, -----	B. J. Crissman, Curwensville, ----- Sykesville Hardware Co., Sykesville, ----- Jacob Hummel, Bigler, -----
473	ROBERT A. WOOLDRIDGE CO., BALTIMORE, MD. Wooldridge Florida Acid Phosphate, -	Dershowe & Bennoge, White Deer, -----
1180	U. S. FERTILIZER CO., BALTI- MORE, MD. Farm Bell Acid Phosphate, -----	J. C. Birely, New Oxford, -----

†Composite sample.

PHOSPHATE—Continued.

Moisture in 100 pounds.	Phosphoric Acid in 100 Pounds.					Computed commercial value of 2,000 pounds at Department rating.	Selling price of 2,000 pounds at point of selection.	Sample number.
	Available.			Total.				
	Found.	Guaranteed.	Insoluble.	Found.	Guaranteed.			
11.42	15.24	14.00	.57	15.81	15.00	14.38	{ \$16.50 20.00 14.00	338
8.76	12.63	12.00	.94	13.57	13.00	12.66		697
							129	
9.96	15.30	14.00	.68	16.07	15.00	14.50	13.00	473
9.19	16.51	14.00	.33	16.84	15.00	15.21	12.00	1180

*Constituent falls below guaranty.

GROUND BONE

Furnishing Phosphoric

Sample number.	Manufacturer and Brand.		From Whom Sample Was Taken.	
	AMERICAN AGRICULTURAL CHEMICAL CO., THE, NEW YORK, N. Y.			
541	†Fine Ground Bone, -----		Joseph Kinsley, Osterburg, -----	
837			Donaldson Hardware Co., Beaver, -----	
573			John T. Crill, Mercer, -----	
	ARMOUR FERTILIZER WORKS, BALTIMORE, MD.			
327	†Bone Meal, -----		S. G. Updegraff, Williamsport, -----	
209			Seep Bros., Oil City, -----	
823			J. S. Hershberger, Everett, -----	
	BAUGH & SONS CO., PHILADELPHIA, PA.			
494	†B's Raw Bone Meal Warranted Pure, -----		A. K. Mohr, Coopersburg, -----	
130			Rauch & Swartzel, Clearfield, -----	
830			Francis Baker, Everett, -----	
	BERG CO., THE, PHILADELPHIA, PA.			
1652	Berg's Raw Bone, Fine, -----		Edw. F. Bracken, Paoli, -----	
	BOWKER FERTILIZER CO., NEW YORK, N. Y.			
1283	Bowkers Bone Flour, -----		W. C. Beckert, Pittsburg, N. S., -----	
1936	Bowkers Pure Ground Bone, -----		A. Hostettler, Scalp Level, -----	
	BUFFALO FERTILIZER CO., BUFFALO, N. Y.			
1871	Pure Raw Bone, -----		D. J. Davis, Ebensburg, -----	
844	†Bone Meal, -----		E. H. Harmon, DuBois, -----	
699			Reynoldsville Hardware Co., Reynoldsville, -----	
1009			Elcher & Graft & Co., Scottsdale, -----	
	HENRY V. BAXTER, CHESTER, PA.			
1064	Pure Ground Bone, -----		Henry V. Baxter, Chester, -----	
	HAPLEIFH & CO., PHILADELPHIA, PA.			
1114	Pure Button Bone Dust, -----		S. C. Walker & Co., Chadds Ford Junction, ---	
	FRANK HARTRANFT, COATESVILLE, PA.			
178	Pure Ground Bone, -----		Preston Powell, Jennersville, -----	
	S. M. HESS & BRO., INC., PHILADELPHIA, PA.			
820	Fine Ground Bone, -----		Ira Price, Everett, -----	
	HUBBARD FERTILI-7R CO., THE, BALTIMORE, Md.			
1460	Hubbard's Warranted Raw Bone, -----		D. J. Trout, Stewartstown, -----	

†Composite sample.

FERTILIZERS.

Acid and Nitrogen.

Moisture in 100 Pounds.	Mechanical Analysis.		Chemical Analysis.				Computed commercial value of 2,000 pounds at Department rating.	Selling price of 2,000 pounds at point of selection.	Sample number.
	Diameter less than 1/50 inch "Fine."	Diameter greater than 1/50 inch "Coarse."	Phosphoric Acid.		Nitrogen.				
			Found.	Guaranteed.	Found.	Guaranteed.			
5.98	59	41	24.30	22.88	2.60	2.47	30.87	{ 30.00 ----- 33.00	541 837 573
3.70	43	57	23.44	22.50	2.36	2.47	27.84	{ 32.00 33.00 30.00	827 809 828
6.23	48	52	*21.15	21.50	3.74	3.70	32.62	{ 32.00 32.00 32.00	494 130 830
6.32	30	70	23.08	20.00	3.55	3.00	31.86	31.00	1652
4.76	99	1	21.20	19.22	3.28	2.06	34.00	40.00	1283
6.74	51	49	22.13	20.50	3.84	3.29	33.79	31.00	1936
6.00	56	44	*16.07	23.00	3.50	3.30	28.84	{ 30.00 30.00 32.00	1871 884 689
7.70	54	46	23.98	22.00	2.79	2.90	31.08	34.00	1609
5.21	46	54	25.65	25.00	3.08	2.47	32.70	30.00	1664
9.81	69	31	26.43	25.84	*3.50	3.98	36.78	30.00	1111
6.00	38	62	24.96	22.00	*3.49	4.12	33.45	32.00	178
5.43	57	43	26.41	22.90	2.69	2.47	32.58	-----	820
5.50	45	55	23.28	22.00	3.83	3.69	34.20	29.00	1460

*Constituent falls below guaranty.

GROUND BONE

Sample number.	Manufacturer and Brand.	From Whom Sample Was Taken.
1435 1887	LANCASTER BONE FERTILIZER CO., LANCASTER, PA. †Pure Ground Bone, -----	Josiah Flinchbaugh, Windsorville, ----- Dr. J. Rumford, Wilmore, -----
1640	D. B. MARTIN CO., PHILADELPHIA, PA. Martin's Pure Ground Bone, -----	Harry Wilson, Fraser, -----
1209	POLLOCK FERTILIZER CO., BALTIMORE, MD., BY A. A. C. CO., THE, N. Y. Pollock's Soft Ground Bone, -----	Strayer Bros., West York, -----
1268 1765	READING BONE FERTILIZER CO., READING, PA. †Pure Raw Bone, -----	W. H. Searfoss, Wyoming, ----- D. Ross Gregory, Petersburg, -----
815	JOHN T. SWACK, DUBOIS, PA. Swack's Pure Ground Bone, -----	Hibner Hoover & Co., DuBois, -----
1037	D. A. THOMAS & CO., HAGERTOWN, MD. Thomas' Fine Raw Bone, -----	Nickles & Stewart, Shippensburg, -----
916	I. P. THOMAS & SONS CO., PHILADELPHIA, PA. Pure Ground Bone, -----	Wm. J. Moyer, Greenville, -----
1310	JAMES THOMAS, WILLIAMSPORT, PA. Thomas' Animal Ground Bone, -----	Coryell & Russ Co., St. Marys, -----
1120	F. W. TUNNELL & CO., PHILADELPHIA, PA. Pure Ground Bone, -----	James Dunlap, Elk View, -----
185	YORK CHEMICAL WORKS, YORK, PA. Dempwolf's Pure Ground Bone, -----	W. S. Hasting & Sons, Atglen, -----

†Composite sample.

FERTILIZERS—Continued

Moisture in 100 Pounds.	Mechanical Analysis.		Chemical Analysis.				Computed commercial value of 2,000 pounds at Department rating.	Selling price of 2,000 pounds at point of selection.	Sample number.
	Diameter less than 1/80 inch "Fine."	Diameter greater than 1/80 inch "Coarse."	Phosphoric Acid.		Nitrogen.				
			Found.	Guaranteed.	Found.	Guaranteed.			
5.81	22	78	24.46	22.80	3.82	3.25	33.13	{ 128.00 30.00	1435 1807
2.21	50	50	24.30	22.90	1.50	1.65	25.90	27.00	1646
3.81	61	39	15.28	18.73	2.40	2.47	28.76	28.00	1209
4.49	85	65	20.27	18.00	3.47	3.28	30.16	{ 130.50 30.00	1268 1765
7.45	30	70	*21.49	30.00	*3.55	4.00	30.80	32.00	845
5.88	55	45	*19.63	20.00	4.78	3.70	36.06	-----	1087
7.04	-----	-----	24.30	23.00	*2.21	2.47	31.65	28.00	916
3.28	51	49	*23.05	25.00	1.84	1.65	26.90	32.00	1319
5.09	52	48	26.96	25.00	2.86	2.47	37.16	30.00	1120
2.55	58	42	23.65	23.00	2.47	2.47	29.70	30.00	185

*Constituent falls below guaranty.

DISSOLVED BONE

Sample number.	Manufacturer and Brand.	From Whom Sample Was Taken.
661	BAUGH & SONS CO., PHILADELPHIA, PA. Baugh's Pure Dissolved Animal Bone,--	C. V. Smith, E. Stroudsburg, -----
	BOWKER FERTILIZER CO., NEW YORK, N. Y.	
973	†Bowker's Ammoniated O. I. O.	J. A. Kimbel, Elysburg, -----
1743	Phosphate.	J. S. Lenhart, Hamburg, -----
103	GRIFFITH & BOYD CO., BALTIMORE, MD. Pure Dissolved Animal Bone, -----	H. G. VanDyke, Goldenville Station, -----
1400	LISTER AGRICULTURAL CHEMICAL WORKS, NEWARK, N. J. Lister's Celebrated Ground Bone and Tankage, Acidulated.	Edw. Bupp & Co., York, -----
1020	D. B. MARTIN CO., PHILADELPHIA, PA.	
731	†Martin's Crop Producer, -----	T. J. Novmyer, Lewistown, -----
1194		L. P. White, Manheim, -----
		A. P. Lippy, Littlestown, -----
120	READING BONE FERTILIZER CO., READING, PA. Dissolved Animal Matter, -----	Grover C. Myers, Gardners Station, -----

†Composite sample.

FERTILIZERS.

Moisture in 100 Pounds.	Phosphoric Acid in 100 Pounds.					Nitrogen in 100 Pounds.		Computed commercial value of 2,000 pounds at Department rating.	Selling price of 2,000 pounds at point of selection.	Sample number.
	Available.			Total.		Found.	Guaranteed.			
	Found.	Guaranteed.	Insoluble.	Found.	Guaranteed.					
5.61	*12.56	13.00	1.98	14.54	-----	2.29	2.06	22.20	31.00	661
10.85	10.27	10.00	1.52	11.79	11.00	.82	.62	19.47	{ 115.00 20.00	978 1743
10.73	11.52	10.00	1.79	13.31	11.00	2.00	2.06	26.60	27.00	103
5.77	6.62	-----	8.26	14.88	12.00	2.90	2.67	27.86	24.00	1469
11.94	10.15	10.00	1.16	11.21	-----	1.16	1.03	19.62	{ 17.00 115.00 17.00	1020 731 1194
9.92	10.34	10.00	1.85	12.19	11.00	.89	.82	20.17	17.00	120

*Constituent falls below guaranty.

MISCELLANEOUS

Sample number.	Manufacturer and Brand.	From Whom Sample Was Taken.	Phosphoric	
			Available.	
			Moisture in 100 Pounds.	
			Found.	Guaranteed.
AMERICAN AGRICULTURAL CHEMICAL CO., THE, NEW YORK, N. Y.				
777	†Genuine German Kalnit, -----	F. W. Atkinson, Clifford, -----	.26	-----
385		John Artley, Muncy, -----		
1707		Kemerer & Co., Lehighton, -----		
1706	High Grade Sulphate of Potash, -----	Kemerer & Co., Lehighton, -----	1.19	-----
224	†Nitrate of Soda, -----	W. H. Mitman, Easton, -----	1.30	-----
54		H. B. Chaffee, Pottersville, -----		
813		The J. N. Getz Co., Lock Haven.		
ATLANTIC FERTILIZER CO., BALTIMORE, MD.				
1206	Genuine German Kalnit, -----	N. N. Loose, Menges Mills, -----	.37	-----
604	Nitrate of Soda, -----	J. O. Lebo, Millersburg, -----	.92	-----
ARMOUR FERTILIZER WORKS, BALTIMORE, MD.				
578	Genuine German Kalnit, -----	O. L. Shipman, Hughesville, -----	.70	-----
1227	Muriate of Potash, -----	J. I. Yetter, Saylorsburg, -----	.52	-----
1226	Nitrate of Soda, -----	J. I. Yetter, Saylorsburg, -----	1.84	-----
BOWKER FERTILIZER CO., NEW YORK, N. Y.				
247	Nitrate of Soda, -----	L. G. Landis, Riverside, -----	1.09	-----
COE-MORTIMER CO., NEW YORK, N. Y.				
1274	†Basic Slag, Thomas Phosphate Powder.	I. N. Scott & Co., Pittsburg, -----	.18	-----
412		B. O. Tourges, New Milford, -----		
1838		Davis Bros., Kane, -----		
GERMAN KALI WORKS, BALTIMORE, MD.				
742	†Kalnit, -----	S. Book & Bros., Quarryville, -----	.69	-----
711		B. W. Fetzner, Brookville, -----		
1446		O. F. Grove, Felton, -----		
1665	Manure Salt, -----	Henry V. Baxter, Chester, -----	.59	-----
123	†Nitrate of Soda, -----	E. J. Flynn, Gramplan, -----	1.96	-----
741	†Sulphate of Potash, -----	S. Book & Bro., Quarryville, -----	.39	-----
486		Wm. Klock, Pittman, -----		
274		W. H. Muth, Lititz, -----		
1275		I. W. Scott & Co., Pittsburg, -----		
GRIFFITH & BOYD CO., BALTIMORE, MD.				
104	†Genuine German Kalnit, -----	H. G. Van Dyke, Goldenville Station.	.42	-----
330		Weaver & McCallahan, Montoursville.		
999	Nitrate of Soda, -----	Wm. M. Vease, Kantz, -----	3.11	-----
S. M. HESS & BROS., INC., PHILADELPHIA, PA.				
819	Muriate of Potash, -----	Ira Price, Everett, -----	1.15	-----
HUBBARD FERTILIZER CO., THE, BALTIMORE, MD.				
113	Hubbard's Pure German Kalnit, -----	Biglerville Warehouse Co., Biglerville.	1.86	-----

†Composite sample.

FERTILIZERS.

Acid in 100 Pounds.			Potash in 100 Pounds.			Nitrogen in 100 Pounds.		Computed commercial value of 2,000 pounds at Department rating.	Selling price of 2,000 pounds at point of selection.	Sample number.	
Insoluble.	Total.		Present as muriate.	Present as sulphate.	Total.		Found.				Guaranteed.
	Found.	Guaranteed.			Found.	Guaranteed.					
			12.62		12.62	12.00			14.85	{ 15.00 14.00 14.00	777 835 1707
			48.80		48.80	48.00			60.56	{ 56.00 49.00	1706 224
							15.00	15.00	61.99	{ 52.50 55.00	54 813
			15.49		15.49	12.40			17.82	12.50	1906
							15.92	15.65	63.06	50.00	604
			12.52		12.52	12.00			14.76	14.00	878
			51.35		51.35	48.00			54.38	45.00	1227
							15.98	14.81	63.44	52.00	1226
							16.12	15.00	63.82		247
	12.00	17.00								{ 20.00 19.00 26.00	1274 412 1338
			13.18		13.18	12.00			15.46	{ 13.00 14.00 12.00	742 711 1446
			21.53		21.53	20.00			23.98	{ 16.00 16.00	1666 1666
							15.72	15.00	62.29	{ 50.00 50.00	122 741
			51.14		51.14	48.00			63.88	{ 54.00	485 274 1275
			12.70		12.70	12.00			14.96	{ 15.00 14.00	104 330
							*12.58	15.00	50.38		909
			48.96		48.96	49.00			51.98		819
			12.78		12.78	12.40			15.07	14.00	113

*Constituent falls below guaranty.

MISCELLANEOUS FERTI

Sample number.	Manufacturer and Brand.	From Whom Sample Was Taken.	Moisture in 100 Pounds.	Phosphoric	
				Available.	
				Found.	Guaranteed.
237	LISTER'S AGRICULTURAL CHEMICAL WORKS, NEWARK, N. J. Nitrate of Soda, -----	Sylvester Gair, Easton, -----	1.63	-----	-----
1962	D. B. MARTIN CO., PHILADELPHIA, PA. Dried Blood, -----	D. B. Martin Co., New Holland	8.36	-----	-----
1478	PATAPSCO GUANO CO., BALTIMORE, MD. Genuine German Kainit, -----	J. N. Hersh, New Oxford, ---	2.70	-----	-----
939	PIEDMONT MT. AIRY GUANO CO., BALTIMORE, MD. Sulphate of Potash, -----	John G. Simpson, Huntingdon,	1.62	-----	-----
1612	PITTSBURG PROVISION & PACKING CO., PITTSBURG, PA. Pure Bone and Meat, -----	Weddle & Sutton, West Newton	12.26	-----	-----
1116	RAISIN-MONUMENTAL CO., BALTIMORE, MD. Raisin's Genuine German Kainit, -----	S. C. Walker & Co., Chadds Ford Junction, H. E. Huston, Saitillo, -----	1.11	-----	-----
937 1993	†Muriate of Potash, -----	A. H. Griffin, Elton, -----	.58	-----	-----
406 1844	READING BONE FERTILIZER CO., READING, PA. Muriate of Potash, ----- Nitrate of Soda, -----	G. B. Wachole, Luthersburg, --- W. H. Strass, Lehighton, ----	.48 1.66	-----	-----
007	D. W. ROMBERGER, ELIZABETHVILLE, PA. Romberger Tankage, -----	D. W. Romberger, Elizabethville.	5.48	-----	-----
1152	F. S. ROYSTER GUANO CO., BALTIMORE, MD. Genuine German Kainit, -----	John W. Kling, York Springs, R. D. 6.	1.19	-----	-----
1346 1891 782 1153	†Muriate of Potash, ----- †Nitrate of Soda, -----	N. C. Creasy, Catawissa, ---- D. C. Brittain, Register, Wm. A. Russell, Carbondale, John W. Kling, York Springs, R. D. 6.	.78 1.62	-----	-----
407	JOHN SWACK, DUBOIS, PA. Swacks Ground Tankage, -----	G. B. Wachole, Luthersburg, --	9.06	-----	-----
1039	D. A. THOMAS & CO., HAGERTOWN, MD. Kainit, -----	Nickles & Stewart, Shippensburg.	1.57	-----	-----
83 1533	I. P. THOMAS & SONS CO., PHILADELPHIA, PA. †Top Dresser for Grass, -----	C. A. Hershey, Tillie, Ed. Shuey, Walpers Church, --	3.86	-----	-----
1005	YORK CHEMICAL WORKS, YORK, PA. German Kainit, -----	E. N. Erdley, Salem, -----	.27	-----	-----

†Composite sample.

LIZERS—Continued.

Acid in 100 Pounds.			Potash in 100 Pounds.				Nitrogen in 100 Pounds.		Computed commercial value of 2,000 pounds at Department rating.	Selling price of 2,000 pounds at point of selection.	Sample number.
Insoluble.	Total.		Present as muriate.	Present as sulphate.	Total.		Found.	Guaranteed.			
	Found.	Guaranteed.			Found.	Guaranteed.					
							15.70	15.00	62.29	52.00	237
							*7.82	9.89	40.64		1902
			11.30		*11.30	12.00			13.58	14.50	1178
			48.64		48.64	48.00			51.62	50.00	950
	*4.81	8.00					8.63	4.93	37.70	28.00	1612
			11.80		*11.80	12.00			4.04	14.00	1116
			50.38		50.38	49.00			53.41	150.00 45.00	937 1993
			49.80		*49.80	50.00			52.80 62.29	44.00 57.00	406 1844
	*13.45	13.97					6.12	6.16	40.04	40.00	607
			12.78		12.78	12.00			15.06	14.00	1152
			51.50		51.50	50.00			54.52	145.00 45.00 150.00 51.00	1346 1801 782 1153
							15.94	15.22	63.25		
	17.64	16.00			*.14	3.00	*2.48	3.00	27.76	25.00	407
			12.32		12.32	12.00			14.55		1039
			5.46	1.82	7.28	5.00	*8.06	9.00	43.09	146.00 47.50	83 1533
			12.00		12.00	12.40			14.86		1006

*Constituent falls below guaranty.



INSTRUCTIONS TO AGENTS ENGAGED IN COLLECTING SAMPLES OF FERTILIZERS FOR THE DEPARTMENT OF AGRICULTURE OF PENN- SYLVANIA.

Fertilizer manufacturers sometimes allege that there have been errors made on the part of our sampling agents in selecting samples for analysis. It is due these manufacturers, as well as this Department, that the greatest care shall be exercised on the part of all connected with this work, to insure that the samples are fairly taken, are properly labeled and sealed, and are sent to the chemist in exactly the condition in which the goods were found. In order, therefore, that there may be uniformity of practice on the part of our agents, the following instructions have been prepared for their guidance, and strict adherence to these directions is required:

1st.—No sample shall be taken from the manufacturer's warehouse.

2nd.—No agent shall draw more than two samples of any one brand of fertilizer, unless for some special reason, which he shall state in his report.

3d.—Two samples of each brand shall be taken, if possible, selecting them from different localities.

4th.—Each agent shall make report from time to time in duplicate, giving the number of each sample taken, in consecutive order; the name and the address of the manufacturer, the name and address of the agent selling the goods from which the sample is taken; an EXACT copy of the name of the brand of fertilizer; and the selling price per ton of 2,000 lbs. at a point of selection. He shall then subscribe his name to each report and send one copy to the official chemist and the other to the Secretary of Agriculture, at Harrisburg, Pa.

5th.—Agents shall keep full memoranda of all the samples; stating the number of packages from which the sample is taken, together with such additional notes of information as may be of service for future reference, in case the accuracy of their work is called in question.

6th.—The sample for analysis must be taken from at least four sacks. The sampling tube to be run its full length from the top toward the bottom down the centre of the sack, then turned two or three times to fill it, and the contents emptied upon a sheet of clean, tough paper. The samples from the four sacks to be then thoroughly mixed together, rolling the fertilizer back and forth across the paper by lifting the sides alternately. After thoroughly mixing, take a spatula and run it close along the paper under the mixture, lifting it straight up so as to get a perfect cross section of the heap.

7th.—The sample taken as in paragraph 6, is to be AT ONCE packed into the glass bottle provided for the purpose; the lid immediately screwed down tight, and upon the label attached, give the name of the sampling agent and the number of the sample, as marked upon the agent's list. The bottle containing the fertilizer, to be at once inserted into the paper case provided, first writing his name and the number corresponding to that on the bottle on the outside of the case. Then moisten the gum flap and seal securely.

8th.—In shipping to the chemist, great care is to be taken to so pack the bottles as to avoid breaking, and the shipping directions should be securely attached to the package, with the name of the sampling agent marked on the box.

9th.—Agents will keep the Secretary of Agriculture informed in advance of the points to be visited, so as to be promptly reached by telegraph or mail, if necessary.

SPECIAL NOTICE.

This Department expects to continue the publication, early in each year, of a list of fertilizer manufacturers who have complied with the law of this State by filing with the Department the required analysis and paying the legal license fee, together with the trade names of the several brands for which such fees have been paid, so that dealers may be able to avoid making themselves liable to prosecution.

The policy of the Department for some time in the past was to bring prosecutions against manufacturers, where it was possible to reach them, rather than against local dealers who are found selling unregistered goods, or goods that in other respects fail to meet the requirements of the law.

It was found, however, that in pursuing this method exclusively, we were sometimes subject to long delays before cases brought, came to trial, and as our witnesses are agents and chemists of the Department who are liable to change, it sometimes happened that before the cases were listed for trial they had gone to some other field and their presence in Court could not be secured.

For this reason prosecutions, when necessary, are now being instituted either against the manufacturers or persons selling goods that do not comply with the law as we may elect.

N. B. CRITCHFIELD,
Secretary of Agriculture.

Commonwealth of Pennsylvania

DEPARTMENT OF AGRICULTURE

BULLETIN No. 213

PROCEEDINGS OF THE
FARMERS'
Annual Normal Institute
AND SPRING MEETING
State Board of Agriculture

COMPILED BY

A. L. MARTIN, *Director of Institutes*



HELD IN THE COURT HOUSE, LANCASTER, PA.
MAY 23 TO 26, 1911

HARRISBURG:

C. E. AUGHINBAUGH, PRINTER TO THE STATE OF PENNSYLVANIA
1911

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May 27, 1912
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PREFACE

Commonwealth of Pennsylvania,
Department of Agriculture,

Harrisburg, Pa., July 20, 1911.

There is perhaps no source of information upon subjects relating to either practical or scientific agriculture that is so easily available as the Farmers' Institute, and whatever adds to the efficiency of these institutes is of paramount importance. The hope of increasing their usefulness to the farmers of the State has led to the establishment of what is known as the Farmers' Normal Institute, in which all institute managers and lecturers of the State come together once a year for consultation and instruction.

In order that the instruction given at these institutes may be available to the greatest possible number, this Department publishes in bulletin form their proceedings, and so we send out the following bulletin, No. 213, containing the full proceedings of the Normal Institute held at Lancaster, Pa., May 23-26, 1911, in the hope that it may prove helpful upon the many farms and in the many farmhouses to which it may come.

N. B. CRITCHFIELD,
Secretary of Agriculture.



LETTER OF TRANSMITTAL

Commonwealth of Pennsylvania,
Department of Agriculture,
Harrisburg, Pa., July 18, 1911.

Hon. N. B. Critchfield, Secretary of Agriculture:

Dear Sir: I have the honor to present herewith, bulletin of the Ninth Annual "Farmers' Normal Institute," which was held at Lancaster, Pa., May 23 to 26, 1911.

Very respectfully,

A. L. MARTIN,
Director of Institutes.



MEMBERS

OF THE

PENNSYLVANIA STATE BOARD OF AGRICULTURE

FOR THE YEAR 1911

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 HON. A. E. SISSON, Auditor General.
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ELECTED BY COUNTY AGRICULTURAL SOCIETIES

	Term expires.
Adams, ...A. I. Weidner, ...Arendtsville,	1912
Allegheny, ...A. J. Purdy, ...Imperial, R. F. D. No. 1,	1912
Armstrong, ...S. S. Blyholder, ...Kelly Station,	1914
Beaver, ...A. L. McKibben, ...New Sheffield,	1914
Bedford, ...Wm. F. Biddle, ...Everett, R. F. D.,	1912
Berks, ...H. G. McGowan, ...Geiger's Mills,	1913
Blair, ...W. Frank Beck, ...Altoona,	1914
Bradford, ...F. D. Kerrick, ...Towanda,	1913
Bucks, ...B. Frank Wambold, ...Sellersville,	1914

			Term expires.
Butler, ...	W. H. Milliron, ...	Euclid, ...	1914
Cambria, ...	Jas. Westrick, ...	Patton, R. F. D. No. 2, ...	1913
Cameron, ...			
Carbon, ...			
Centre, ...	John A. Woodward, ...	Howard, ...	1912
Chester, ...	M. E. Conard, ...	Westgrove, ...	1912
Clarion, ...	J. H. Wilson, ...	Clarion, ...	1913
Clearfield, ...	Peter Gearhart, ...	Clearfield, ...	1913
Clinton, ...	J. A. Herr, ...	Millhall, R. F. D., ...	1914
Columbia, ...	A. P. Young, ...	Millville, ...	1912
Crawford, ...	J. S. Patton, ...	Hartstown, ...	1914
Cumberland, ...			
Dauphin, ...	Edward S. Keiper, ...	Middletown, ...	1914
Delaware, ...	E. J. Durnall, ...	Swarthmore, ...	1914
Elk, ...	John M. Witman, ...	St. Mary's, ...	1911
Erie, ...			
Fayette, ...			
Forest, ...			
Franklin, ...	John P. Young, ...	Marion, ...	1914
Fulton, ...	J. L. Patterson, ...	McConnellsburg, ...	1913
Greene, ...	N. M. Biddle, ...	Carmichaels, ...	1913
Huntingdon, ...	Geo. G. Hutchison, ...	Warrior's Mark, ...	1912
Indiana, ...	S. C. George, ...	West Lebanon, ...	1913
Jefferson, ...	Peter B. Cowan, ...	Brookville, ...	1913
Juniaata, ...	Matthew Rodgers, ...	Mexico, ...	1912
Lackawanna, ...	Hornce Seamans, ...	Factoryville, ...	1913
Lancaster, ...	J. Aldus Herr, ...	Lancaster, ...	1914
Lawrence, ...	Sylvester Shaffer, ...	New Castle, ...	1913
Lebanon, ...	H. C. Snively, ...	Cleona, ...	1913
Lehigh, ...	P. S. Fenstermaker, ...	Allentown, ...	1912
Luzerne, ...	J. E. Hildebrant, ...	Dallas, R. F. D., ...	1914
Lycoming, ...	A. J. Kahler, ...	Hughesville, ...	1912
McKean, ...	O. W. Abbey, ...	Turtle Point, ...	1913
Mercer, ...	W. C. Black, ...	Mercer, ...	1914
Mifflin, ...	M. M. Naginey, ...	Milroy, ...	1913
Monroe, ...	F. S. Brong, ...	Saylorsburg, ...	1913
Montgomery, ...	John H. Schultz, ...	Norristown, ...	1914
Montour, ...	J. Miles Derr, ...	Milton, R. F. D., ...	1913
Northampton, ...	C. S. Messinger, ...	Tatamy, ...	1912
Northumberland, ...	I. A. Eschbach, ...	Milton, R. F. D., ...	1914
Perry, ...	A. T. Holman, ...	Millerstown, ...	1913
Philadelphia, ...	David Rust, ...	Philadelphia, ...	1913
Pike, ...			
Potter, ...			
Schuylkill, ...	John Shoener, ...	New Ringgold, ...	1913
Snyder, ...			
Somerset, ...	John C. Weller, ...	Rockwood, ...	1914
Sullivan, ...	E. R. Warburton, ...	Campbellsville, ...	1912
Susquehanna, ...	Frank A. Davies, ...	Montrose, ...	1913
Tioza, ...	Calvin H. DeWitt, ...	Mansfield, ...	1914
Union, ...	J. Newton Glover, ...	Vicksburg, ...	1914
Venango, ...			
Warren, ...	R. J. Weld, ...	Sugargrove, ...	1914
Washington, ...	D. S. Taylor, ...	Burgettstown, ...	1914
Wayne, ...	Warren E. Perham, ...	Pleasant Mount, ...	1914
Westmoreland, ...	M. P. Shoemaker, ...	Greensburg, ...	1913
Wyoming, ...	D. A. Knuppenburg, ...	Lake Carey, ...	1913
York, ...	G. F. Barnes, ...	Rossville, ...	1914

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Feeding Stuffs, ...G. G. Hutchison, ...Warrior's Mark.

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Hon. H. C. Snavelly, ... Cleona.
Peter Gearhart, ... Clearfield.
Matthew Rodgers, ... Mexico.
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POULTRY

W. Theo. Wittman, Chairman, ... Allentown.

PROCEEDINGS OF THE SPRING MEETING OF THE PENNSYLVANIA STATE BOARD OF AGRICULTURE, HELD IN THE COURT HOUSE, LANCASTER, PA., May 23, 1911.

Tuesday, May 23, 1911, 9.30 A. M.

Vice President George G. Hutchison in the Chair.

The CHAIRMAN: The first order of business is the roll-call of members. The Secretary will please call the roll.

Secretary Critchfield called the roll, in answer to which the following gentlemen responded to their names:

A. I. Weidner, Adams County; A. J. Purdy, Allegheny County; S. S. Blyholder, Armstrong County; A. L. McKibben, Beaver County; W. Frank Beck, Blair County; F. D. Kerrick, Bradford County; W. H. Milliron, Butler County; John A. Woodward, Centre County; M. E. Conard, Chester County; J. H. Wilson, Clarion County; Peter Gearhart, Clearfield County; J. A. Herr, Clinton County; A. P. Young, Columbia County; John P. Young, Franklin County; J. L. Patterson, Fulton County; George G. Hutchison, Huntingdon County; S. C. George, Indiana County; Matthew Rodgers, Juniata County; Horace Seamans, Lackawanna County; J. Aldus Herr, Lancaster County; A. J. Kahler, Lycoming County; O. W. Abbey, McKean County; M. M. Naginey, Mifflin County; John H. Schultz, Montgomery County; C. S. Messinger, Northampton County; I. A. Eschbach, Northumberland County; John Shoener, Schuylkill County; John C. Weller, Somerset County; Calvin H. DeWitt, Tioga County; J. Newton Glover, Union County; R. J. Weld, Warren County; D. S. Taylor, Washington County; Warren E. Perham, Wayne County and G. F. Barnes, York County.

The SECRETARY: There is a quorum present, Mr. Chairman.

The CHAIRMAN: The next item on the program is the reading of the minutes of our last meeting. The Secretary will please read the minutes.

The Secretary thereupon read the minutes of the last meeting, which were adopted as read.

The CHAIRMAN: Next in order is the appointment of the Committee on Credentials. The Chair will appoint as the Committee on Credentials, Dr. W. Frank Beck, Blair county; Peter Gearhart, Clearfield county; Hon. A. J. Kahler, Lycoming county; J. C. Weller, Somerset county and J. A. Herr, Clinton county.

Anyone having any credentials of election as members of the Board or delegates elected by agricultural societies or otherwise, will please hand them to the Secretary or Dr. Beck, the Chairman of the Committee. The Committee will be excused to retire and pass on the credentials.

Is there any other matter of business that the Board wishes to take up while this Committee is in session. There is no program prepared for this morning's session of the Board and we will have to take up subjects that may be of interest to the Board and in our work. We have with us this morning a gentleman who has been outside of our State and nation for sometime, looking over agriculture in other countries, and I know at this time you will be pleased to look in the face of Dr. Hunt and have him say a word.

DR. HUNT: In response to the invitation of the Chairman, I might say a few words to you this morning in view of the fact that you have nothing else on the program to disturb you, but I do feel, Mr. Chairman, a good deal like a little chameleon. "What has become of that little chameleon Manda had," inquired Rufus. "She done lost that," replied Zek. "She was one day playing with it, putting him on red to see him turn red; putting him on green to see him turn green; putting him on blue to see him turn blue; and then that poor little girl, not satisfied with letting good enough alone, put him on a plaid and he done bust himself trying to make good." So I think if I try to fill up the morning from ten to twelve o'clock I probably would "done bust myself trying to make good." But I am to speak to-night. I promised myself and my wife that when I got back to America I would forget I was ever in Europe; I would not say a word about it. But I found when I got to my office on the 1st of May that Prof. Agee had made a date down here without asking me, because he could not reach me. I have been in such position I could not be very well reached for seven or eight months with anything like business, purposely so.

I will say this to you: That I never understood until I went to Europe how much we owe to our Puritan ancestors. Now, I am not a Puritan myself—far from it—but I never understood until I traveled through Europe how civilization has been affected by the people who landed on Plymouth Rock. We are cleaner bodied, we are cleaner minded, we are more capable because of the traditions which surround us. Why gentlemen, I went into a first-class hotel in Marseilles, and they have a standing advertisement that they have eight bath rooms in that hotel. I wanted to take a bath and they said that the bath room was on the fourth floor and I was on the seventh. Now, of course, bath rooms do not make civilization; but we are cleaner bodied people because of certain conditions, and so I might go on all the way down the line. Why, an unmarried woman took me to task in Freiberg because the hotels in America would not entertain Mr. Gorky, the Russian novelist, who left his wife in Europe and publicly came to this country with another woman; an unmarried woman took me to task for it. I explained to her that it was not a matter of morals with the hotels, but that no hotel dared to take Mr. Gorky when he came to America with another woman, and his wife at home. She said: "I know the woman well; I know the wife. She's a lovely, beautiful woman, and I don't understand your point of view." We

have a different point of view because we are Americans, because we have inherited some traditions, some Puritanical traditions. I presume we are quite different, and so it is with the whole question of Sunday observance. Everywhere in Europe around their cathedrals and churches on Sunday you will find markets. You go inside the churches and there may be 3,000 people worshipping and outside 3,000 or 4,000 buying things or interested in all sorts of games. I am not discussing this question from the standpoint of morals. I am pointing out to you the difference in conditions, if you wish to call it that, the different people, the American and the European type.

Now what I am developing this side of the case for is to develop another side. I may have made a mistake all my life. I hope you have not made that mistake—but I have made the mistake of supposing that our prosperity was due to our natural resources; that we were a new country, with fertile lands, and that by virtue of our great natural resources we are a great prosperous country, and some day when we got around to it we would be the same and have the same trouble as Europe. Ladies and gentlemen, I saw land in Europe that has been farmed for 2,000 years that is as fertile as any land in Lancaster county. France to-day has as great agricultural possibilities as any similar area in America that I know anything about, and I have been from the Atlantic to the Pacific, from the Gulf to the Great Lakes, and if there is any one area in the United States that has any greater agricultural possibilities than France I do not know it. What does that mean? It means that what we have to conserve in this country is manhood; that we are a great country because we have a great people.

We are clean bodied, clean minded. We have an able-bodied class of men and women on the farms and in the cities and it is a competition between men and mind and not between lands, in my judgment. I did not believe that until I went to Europe. I went to Europe with a different idea and I came back to believe that that is why we can continue to compete. The only way our children can inherit the earth is by progress. The only way is to keep the people up to the highest civilization. Years ago a consul to Canada was talking to me in New York City about the United States, and he explained that he had to write an official communication while he was consul to Canada, about the people of Canada and the people of the United States. Now he says he wanted to do justice. He said he could easily say the Canadians do so and so but he could not say the United States did so and so, and he could not because he was an American. He is from Argentine, a young man going to college where I was twelve years ago just at the close of the Spanish-American War. I sat with him at the head of the table and there sat a little girl 14 years of age on the left. This little girl had two brothers in the Spanish-American War. They had come back and you can understand how a girl of 14 would consider the question, having had her brothers in the war. And here was this young Argentinian, who spoke the Spanish as well as English, and after he had talked for half an hour, the girl turned to him, and said: "Why, you are a Spaniard." He looked at her, took in the situation at a glance and he said: "I a Spaniard! No; I am an American." And so this man said he had trouble. "I could not say, speaking of the United States people, the Americans. I could say,

the Canadians; and so, what did I do? I said the Yankees did so and so." That is the point he made to me which I did not understand then. I do not look upon the United States as a nation. I think of it as a new civilization. Well now it took about ten years for that to soak into my head; but I understand it now. I travelled through these countries of Europe, and the lessons that I learned while in them is, that we are properous, that we are looked up to by the peoples of the world, everyone of them. Some of them frankly say they wish they were born in America. If we are looked up to, it is because we represent the highest type of civilization and highest ability.

The CHAIRMAN: I see the Committee on Credentials has returned. Is the Committee ready to report:

DR. BECK, Chairman of Credential Committee: The Committee on credentials begs leave to report as follows:

REPORT OF THE COMMITTEE ON CREDENTIALS.

The committee on Credentials have examined the credentials of J. G. Colts, of Sullivan county, Wm. F. Biddle, of Bedford county and J. C. Hildebrant, of Luzerne county. We find them in proper form and recommend their election as members of the State Board of Agriculture.

W. FRANK BECK, Chairman.
PETER GEARHART,
A. J. KAHLER,
J. C. WELLER.
J. A. HERR.

The CHAIRMAN: You have heard the report of the Committee on Credentials. What is your pleasure in regard to it.

MR. BLYHOLDER: I move you that the report of the committee be received and these two gentlemen's names entered as members of this body.

MR. WELD: I second the motion.

The motion was put and agreed to.

The CHAIRMAN: Is there any other credentials. Anyone come in since? If they have if they will please hand them to any member of this Committee they will be acted on. Are there any delegates present from any agricultural societies with credentials or wish to be elected?

MR. JOEL HERR: I want to call the attention of the Secretary to the fact that the term of Mr. Warburton, of Sullivan county does not expire until January, 1912. And referring to the election of Mr. Hildebrant, it does not take effect until that time. Mr. Hildebrant is here, however, as the Manager of Farmers' Institutes.

The CHAIRMAN: The next item on the program is Unfinished Business. Has the Board any Unfinished Business? Anything over from the last meeting that is not passed upon?

The SECRETARY: There is nothing carried over.

The CHAIRMAN: The next item is New Business. Is there any New Business? There appears to be none. I see present here with us a gentleman who has been a member of this Board for many years, Col. John A. Woodward. I would like him to come forward and say a word and tell us what he thinks about reciprocity with Canada and how it will affect the farmer.

COL. WOODWARD: Gentlemen, without coming forward I want to say, that I have abandoned the farm, therefore I have no information on the subject of reciprocity.

The CHAIRMAN: Speak on any question you see proper for a few minutes, along agricultural lines that may come to your mind.

COL. WOODWARD: Really, I am without information on this subject I have been reading carefully the opinions on both sides and I am not yet ready to express an opinion of my own. There are too many things needed to be solved yet.

The CHAIRMAN: I hoped to get the Colonel out on some subject that will be a little inspiration in the work, but as the question is before you, have any of you any thoughts on this question? Don't get political. What are your views? How will it affect us? Will it be beneficial to us? Mr. Lighty, what do you think? We will take five minute speeches on it if we get it opened.

MR. LIGHTY: Mr. Chairman, I will have to confess that I did not catch the trend of the discussion.

The CHAIRMAN: The question that I asked is this: Will it be beneficial to the American farmer or the Pennsylvania farmer, this proposed reciprocity with Canada?

MR. LIGHTY: I would beg, Mr. Chairman, to be excused. I have learned from my 25 years' reading of various papers and books, a goodly number of them, that apparently the greatest statesmen wish ditto. I have been unable to fathom the question of tariff and free trade. I, not being a student of political economy at all and only a plain farmer, and never studying political economy but only agriculture in the field could positively not enlighten you along that line and will ask to be excused.

The CHAIRMAN: That answer seems like a lawyer's. I see the Lecturer of the Pennsylvania State Grange has come in. Have you a word to say to the Board. If you don't wish to speak on reciprocity take some other subject, though it seems to be a live wire.

MR. DORSETT: Mr. Chairman, I would answer myself, emphatically no. I cannot see where it will benefit the farmer in the least. I come from a county that is largely engaged in dairying and in raising hay. If I am correctly informed, it costs our farmers from \$4.00 to \$5.00 per ton to get their hay into the markets of New York. Our friends in Canada can ship their hay by water for one dollar a ton and they can raise the hay in Canada much cheaper than we can. If that be true, I cannot see how it will benefit the farmers of Tioga county, at least where so largely engaged in raising hay.

Now, so far as dairy products are concerned, we are told that Canada does not keep many dairy cows and is not largely engaged in dairying, yet last year they shipped into the United States some 981,000 pounds of butter, paying the duty of 6 cents per pound. Against that, we shipped into Canada something like 60,000 pounds, paying 4 cents. Now, where does that trade benefit the farmers of Pennsylvania? It seems to me that a country so large in scope as Canada, with so small a population as compared with the United States, they would furnish us more material than we would them, because they with their small population will not begin to eat what we in this great country will. And looking from that side, I cannot see how reciprocity will be of any benefit to the farmers either of Pennsylvania or of the United States.

Another thing that kind of puzzled me a little: Up in Canada those little Canucks have shown unusual wisdom in one particular: They have been able to get away, as it were, with the great wheat trust, if you please to call it that. They have built their elevators and have been in a measure able to fix the price of wheat and to control it, while here in the United States, as we all know, the farmers have but little to say about it.

Another thing comes into my mind: Coming down through that great wheat belt there is a great railroad, and I am told—I do not know how true it is—that much of the stock that is owned in that railroad is held by interests in Wall Street. Now, that is an eye-opener to me, and it seems to me that this whole scheme of reciprocity is gotten up in the interest of corporations and not in the interest of the farmer. They tell us that they are doing it in the interest of the consumer; they want to reduce the high cost of living. That is all nonsense. If they wanted to do that why do they retain the duty on flour after it is manufactured? Why not cut that off along with the rest. If they wanted to help the dairyman by reducing the costs of dairy products why didn't they reduce the cost or reduce the duty on bran and let that in free. But they do nothing of the kind. Everything manufactured still retains the duty. In other words everything the farmer wants to buy he must pay the duty on; the things he has to sell the duty is removed.

The CHAIRMAN: Now the question is opened, we are ready to hear from any others who wish to speak on it?

MR. KESTER: I think James G. Blaine gave the definition of reciprocity as the exchange of things we have for things we do not have with other countries. In applying that definition to this proposition I fail to make it fit. I can make nothing more or less out of this

proposition than simple free trade. Of course, that appellation would be very obnoxious to those who are endeavoring to put it through—free trade—but after all that is what it is. It is a misnomer to call it reciprocity. If put up to the American people under the proper name of free trade it would go down in short order.

MR. DAVIES: I would like to endorse what Brother Dorsett said: That everything the farmer has to sell would be free, and what he has to buy, like bran, would be charged. They all seem to have a great interest in the farmer and want to do a great deal for the farmer.

MR. GEARHART: I would like to say that I am entirely surprised with the farmers of Pennsylvania, the representatives here this morning, that they are so afraid of this question. It is shocking to me, why you are not ready to stand up for your rights, for your interests. This is certainly one of the most damnable pieces of class legislation that ever was attempted in the United States, and why are we afraid of it. Why, when Governor Tener made an effort to press that public utilities bill, that would curb the corporations of the State, they were to a unit against it. It is laid on the table, they say, for another two years at least. And so all along the line. If this reciprocity affected the manufacturers of this State it would never had gone as far as it has and there would be no special session of Congress to consider it. But here it affects the farmer and the farmer only, unless the lumber interests, and bound to affect him and cannot be otherwise. It is plain, if we are going to sell our product in the free market and buy in the protected one. We should stand up for our rights and if we don't we should take our medicine.

MR. JOEL HERR: As far as I can see this reciprocity act is only in favor of Canada. It looks to me as though it may have been gotten up by New York and Washington interests, and all I have to say is that we do not need legislation for Canada. If Canada wants to come into the United States, let her make application and then we will talk reciprocity and receive her. If their people are not interested and want to belong to our United States, let them paddle their own canoe.

MR. GLOVER: There is a situation of this kind; that the people demand cheaper food products and yet at the same time the statement is made that cheaper products cannot be raised by our farmers. Twenty-eight years ago I was in Minnesota for three months. Last Fall I visited the State again and I was surprised to see the manufacturing and dairy interests in the State of Minnesota. The dairies have sprung up. How the people turned their attention from wheat and corn growing to dairying! The same thing that is true of Minnesota is true of the Northwest and the territories over the line. I have a brother-in-law who is farming in Polk county, Minnesota, been there 24 years, and he has written several articles to the papers in regard to this matter. He claims it will hurt their flax crop wonderfully, the barley crop, the wheat crop and hay.

Another thing: One reason why the interests ask for this is because the Great Northern Railroad, of which James Hill is president,

has a number of acres of land up there and as soon as this bill gets through it will help the Great Northern Railroad. It looks to me that this is a bill in the interest of certain interests as opposed to the farmer and I am opposed to it.

MR. CLARK: I reside up in the striking zone where we have thousands and thousands of men pretty near starving. They are not working, and unless they get their troubles settled, we will have thousands, ten thousands of men there for whom there is no work, and what are we going to do with them I know not. But the cry has been, especially in our end of the State, "Living has cost too much." They cannot afford it; they must have something less. I have a brother living in a Western state who says that of late years the farmers have been coming back to their own. For years the farmers of this State have permitted the cities to eat up their farms; eat practically all their farms away; everything was taken off; nothing went back; because of low prices. Now, then, since we are coming back to our own and getting a little what is right and justice, the cities are crying, "Down with high prices," and this sentiment has gone out with such a striking force and has caused such a feeling throughout the nation to-day, that something must be done to meet this great cry.

But in reading this reciprocity act from first to last—I read it over carefully—there is a question in my mind. In the first place, it must be very carefully considered. You know that we have two kinds of tariff—the tariff for revenue and the tariff for protection. The Democratic Party has been called the free trade party. They were not a free trade party. They wanted a tariff for revenue. The Republican Party was called a protective tariff party. They were, and the people, the great majority of the people of this country are in favor of protective tariff. And here is the point. In legislation of this kind the people ought to be taken into consideration, and in this case they have made a drive at the very foundation of the people of this government, the people that own the lands. There is no question about it; not the slightest doubt about it, and as long as the nation will stand up for their highest sources of power that have struck a knife into you, as it were, into our farming interests to-day, what under the heavens can we expect. Now we are sitting still looking on. Who formulated these tariff measures, this reciprocity measure? Who? You fellows up in Canada? You fellows at home? The Lord only knows. It is fixed up and shows up in nice shape. Pass it, a mandatory order goes out. Pass it as it is or get out. If you don't vote for it as it is it will not be accepted. Canada will not accept it. Stand up and vote for it or get out. If you can stand that you can stand most anything.

MR. KAHLER: I think this is a very important question, as already stated; one that the farmers should take more interest in than they apparently do. I want to say right here, if we were asked to give our opinion, my opinion is that it is suicidal to the best interest of the farmer, this reciprocity bill, unless it is passed with some amendments. Our worthy State Lecturer stated that it affected our flour, it effects us everywhere. He might have said meat will be hurt on the hoof, but when it goes to the block there is a special privilege

in that. I am in favor of a fair reciprocity bill, but I think this is giving the roast to the ones protected and giving us the bones. I am emphatically opposed to it without amendments.

DEPUTY SECRETARY MARTIN: I am interested in this discussion and it has brought us back to the final proposition and solution of the great project, and that project is devising a plan by which the products of the farm and garden and the orchards may reach the consumer at a fair and reasonable price. Have you looked over that question and considered it, that the man who produces a pound of butter, a gallon of milk, a bushel of potatoes or a bushel of wheat or ton of hay, only gets a little less than 40 per cent. on that dollar. It does occur to me, with all seriousness, my fellow-farmers, that if there is any one thing we have been utterly lacking in during the last two decades, it has been our failure to make a strenuous effort to solve the problem of the distribution of our products, and this question of reciprocity is driving us to the point the more rapidly. By co-operation, by the establishing of headquarters for farmers' products in all the great centers of trade, will be one of the means by which we could counteract the false accusations of our members of Congress and others in the United States who have attributed falsely, that for the want of farmers products and food is the cause of the present high prices; but I tell you in all seriousness the cause of the high price of living to-day is, that more than 50 per cent. of it is consumed by the middlemen and the intelligent producers of this country have got to solve that problem. The dealers of to-day have closed their eyes to wisdom. Now let us take hold of it in the State of Pennsylvania and every other state and see that the products of our farms reach the consumer at a minimum cost. When we have solved that problem we have solved many problems relative to this cost of living and restrictions that place the products of the farm in competition with one of the greatest grass-growing and wheat-growing countries in the world. It is a serious problem that confronts us as consumers and producers.

MR. SCHULTZ: I don't believe there is a farmer here but what is opposed to this bill, this reciprocity, but it will avail nothing if we stay here until doomsday if we don't take action. I think we should draw up the strongest kind of resolution condemning this bill and send this resolution to the proper places. Let the people know how the farmers of Pennsylvania feel on this matter.

MR. A. P. YOUNG: Mr. Chairman, We have in the West and Northwest a class of farmers who have skinned that magnificent fertile country of its fertility, and now they want to leave it, a great many of them, and cross the border into new fields. They propose to go over there and skim that land and throw their productions in competition with the productions of the land that they have in a manner destroyed. Fertile lands there capable of producing when first cropped 40 to 50 bushels of wheat now produce less than the thin soils of Pennsylvania per acre. Think of it! These same men are going across the border to take the fertility from that new land and throw it in competition with our farms here in the states that they have abandoned and left. It is a mistake. We ought to oppose it with all the power we can raise.

MR. BOND: We may resolute, we may pass a resolution, we may pronounce denunciation of this matter, but what we want now is action. Have we any evidence what we can accomplish by concerted action? I have in mind a little incident less than 24 hours old where compromise failed, where resolution failed, but concerted action produced the results only yesterday afternoon.

DR. CONARD: One of the speakers spoke as though he was much afraid of the term "free trade." Now most of us were brought up to believe in protection, but I think as the years have gone by we come to believe less in this. Just the other night I heard two men arguing and one of them said he had learned something from the older writers, an argument which I had never heard. I want to leave it with you. He said that a high tariff would never stand because it is built on the principle of selfishness. It was a new thought to me and one to remember. I believe it is true. I am not afraid of free trade. I should not object to it particularly; but one thing I do object to and that is free trade upon the products of the farm and protection of the products of the factory and work of the large corporate interests. I would like to ask you this question: If we are not living pretty nearly under free trade for our products and high tariff for the products of those interests?

MR. RANDALL: I would like to say that I think perhaps that we misconceive the idea of the reciprocity when we call it a tariff bill. It is not a tariff bill. It is a reciprocity bill for the purpose of comity between two countries and for the purpose, as proposed by the President, of establishing better feeling between the two countries. As far as the farmer is concerned, it looks like it will injure him to some extent, but I think that we cannot afford to look at it in a selfish way because there are other interests probably as important, not to us but to others, as the agricultural interests to the farmer. Now the President assures us that it is not going to injure the farmers or injure our country, and I think you will agree with me that the President would not want to do anything that would interfere with us. Secretary Wilson says that he does not think that it will injure the farmer to any extent. But if we should denounce the reciprocity bill, we would denounce something outside the farm. You would denounce taking off the tariff on lumber, and I submit to your consideration, gentlemen, whether or not it is necessary to have a cent of tariff on lumber. It is not, because it has come to the position to-day that the farmer won't build a building unless he has to because the hemlock lumber is all sold. I come from a county where hemlock lumber is manufactured, where our Congressman is very much in favor of tariff on lumber, and I had the pleasure of saying to him that I thought it was not necessary, entirely unnecessary, to have a tariff on lumber. How about wood pulp? We are going to take that off with thousands of imports that the President is anxious to have passed. Wood pulp comes into the country with a tariff at the present time and that is the reason the newspaper men raised the price of periodicals throughout the country, because pulp was high. Mr. Martin struck the nail on the head when he said that the middleman ought to be got away from the farmer. That is my idea. Everybody has to admit that the cost of liv-

ing is too high. Everybody knows that and the fact of it is that it is not because the farmer is getting too much for what he has raised, but because the middlemen or speculators upon the commodity of the farmer make it a burden for the laboring man to live. I don't believe, although I represent the agricultural interests of our end of the State to some extent, that President Taft would do a thing that would be an injury to the farmers of Pennsylvania. I don't believe it. And I know he says himself that they can try it and if it does an injury, why then it can be repealed; but he feels sure in saying that I don't believe that President Taft would do anything to cause a blight upon these agricultural interests of this country.

Now I know that this may not meet the views of a great many people. But you take into consideration that it means a reciprocity treaty and not a tariff bill. I have been a Republican from boyhood to manhood and to mature age and I favor protection, but I want to say to you that we have got to face the fact sooner or later that this high tariff has got to be reduced. Whether you are a Republican or Democrat I do not care but this high tariff must be reduced and we must face the fact just as sure as we stand here. The high tariff cannot always exist. So I say in resolving upon this reciprocity bill remember that you cannot do it unless you slap the President and cabinet in the face. It has been asked, Who makes the treaties? The people don't make the treaties. The President and cabinet make them and submit them to the Senate, and if confirmed, they become a law. Anybody knows that.

MR. CLARK: You think because of the tariff on lumber the consumer is paying more for his lumber here than he would if the tariff were removed?

MR. RANDALL: No sir; because there are more middlemen in the agricultural lines than anything else I know. This you will notice all over the country the middlemen speculate everywhere on the people of the country. Our men pay 38 cents a pound for butter in the stores. There are not many middlemen in the lumber business. You know that.

A Member: The point in regard to reciprocity all sums up as Brother Kester of Clearfield has stated. When James G. Blaine established reciprocity with other nations it meant something. It was not a wholesale business without any relation to the American people, and when he went to Germany and said: "Give us your potash and we will give you pork," it meant just that much; and when he said to Chili: "Give us your nitrate of soda and we will give you iron products and cotton fabrics." And so we went the world around, giving the nations the commodities we did not use ourselves and we furnished them with the commodities that they did not produce.

In looking at this question as it is to-day in regard to reciprocity with Canada, we find it entirely different. Take up the Grange News and you will find I think on the 2nd page the wholesale list, and it is sufficiently convincing to me that it is a piece of job work. This has been intimated here already by Brother Young: That we have skinned the West. There is no question about that—until these fertile plains that at one time produced from 40 to 60 bushels of wheat to the acre,

to-day looking over the agricultural statistics we find only producing 14 bushels now. Somebody is not making a living. Somebody is complaining. We have a right to complain of those very farmers who because they could not get fertilizer without going to the trusts or combination of trusts for it have gone into the great wheat belt of Canada where they can produce nearly 40 to 60 bushels an acre.

How about the transportation? They have a rate from Duluth to Buffalo, a distance of more than a thousand miles, and it only costs 33 cents a ton for the thousand miles. Think of it! It is cheaper to transport wheat on the Great Lakes than it is to keep it in the store houses. How are you going to meet competition under such conditions as that? Read up statistics and learn that men who are representatives in the United States Congress are men directly interested in this great Northern scheme, men who have vast lands there and have gotten these men from the West to go up there, 40,000 a year, where they know they can produce wheat much cheaper than on the American soils which have been depleted. Let Americans be on guard.

MR. KERRICK: I know in Lancaster you are all interested in wheat. I have a nephew of my wife who went over to Canada and purchased some three thousand acres of wheat land and he said to me when this bill passes we can get our wheat to America for 25 cents less on the bushel. That means something to Pennsylvania. I claim this is simply free trade for the farmer and I am utterly opposed to the bill. They can produce potatoes and flour cheaper than we can in this country, up in that cool country. You take the tariff off and it means something still to the farmer. If it is not free trade on the farmer I don't know what it means.

MR. BLYHOLDER: It seems to me that we are almost a unit of the same opinion. I believe that we with James G. Blaine all believe in reciprocity, but I believe that we do not believe in the pretense of reciprocity, and I believe that the bill that is before Congress now is a pretense. It is a pretense to the great laboring classes of this country because they have been crying, as well as we have, for cheaper living, and now they come to them with this sop, pretending that it is going to cheapen the products upon which we live, which any man by examining that bill will see at a glance is not true. It does cheapen the farmer's product but it does not permit them to go to the consumer on that same condition. It holds protection of them to the high prices before they reach the consumer. So that I believe that we are, with James G. Blaine, in favor of true reciprocity, call that free trade or what you please. But over and above that we want fair dealings. If they say to us that President Taft says it won't hurt the farmer we will say back to him it won't hurt the farmer to buy his machines and product he wants to buy from the same man that he has to sell what he produces. Therefore, Mr. Chairman, I thought I would hastily draw up a resolution to meet this little idea I have included; but instead of this I will ask that a committee of five be appointed to formulate the views of this body, because I think we should send to our Congressmen and representatives our views, as we did yesterday. I just hastily scratched this and know it is not what we want, but if I read it perhaps we can get it in proper shape:

"Resolved, That we heartily approve of true reciprocity as defined by James G. Blaine; but that we are emphatically opposed to the bill now in Congress which we believe to be deceptive to the producers and much more so to the consumer in this, that it is a pretense to cheapen food stuffs which is not a fact."

Now, then, Mr. Chairman, I move you that a committee of five be appointed to formulate the view of this body and present them to our Congressmen and Senators.

MR. KERRICK: I second the motion.

The motion was put and agreed to.

The CHAIRMAN: I will appoint on that committee Messrs. Blyholder, Kester, Dorsett, Gearhart and Kerrick.

Now if you gentlemen will just adjourn to the adjacent room and get your resolution and return as quickly as possible, it would hasten the time. We have an hour yet.

Is there any other business while these gentlemen are out?

MR. HULL: I want to look at it from the standpoint of the farmer in Mercer county. The Mercer county farmers' interests lie in the prosperity of the iron manufactories. Up along the Ohio the great storehouses there for iron ore are filled almost to their capacity. Take it down at Sharon, Youngstown and Pittsburg, where the iron ore is manufactured into iron, they cannot do it because the storeyards are already filled with the same stuff that we are filled up with and unmanufactured. Why don't they manufacture it? Because the iron yards and the furnaces in the valleys are filled as full as they can pile them with pig iron unmanufactured. There seems to be practically no call for the manufactured pig iron. The people in the valleys who obtain their livelihood from these furnaces and iron manufacturing establishments are walking the streets for something to do. The farmers who take their products into Sharon, Niles, Youngstown; and all these manufacturing points cannot get paid for the products they take there because the people have no money to pay for it. I know this personally, and in our business of market production we never were carrying so many people who were unable to pay as to-day. Now the manufacturers tell the laborers that if they had the output and the market of Canada that they could supply Canada with her pig iron and with the manufactured products that are manufactured through the East from the products of the iron piled up in these yards. I don't want to be considered as in favor of reciprocity but I think that there may be something in the manufacturing establishments that will come out brighter and better. I am not an old man and I have seen many troubles but the most of them never happened.

The CHAIRMAN: Have any of the members died in the knowledge of the Board since the last meeting? The Secretary says he has no record of any.

Deputy Secretary Martin then announced the program for the opening session of the Annual Normal Farmers Institute at 1.30 o'clock.

He also expressed the regrets of the Governor for his inability to be present at any of the sessions owing to the pressure of work incident to the closing sessions of the Legislature.

The CHAIRMAN: I see the Committee on Resolutions has returned. We will now have their report.

Mr. Blyholder then presented the Report of the Committee on Resolutions as follows:

**REPORT OF COMMITTEE APPOINTED TO PREPARE RESOLUTIONS EXPRESSING SENTIMENTS OF THIS BODY
ON RECIPROCITY WITH CANADA.**

Whereas, We believe in Reciprocity as defined by James G. Blaine, and whereas the present bill now pending in Congress discriminates against the farmer inasmuch as it forces him to sell his products in a free market and to continue to buy on a protected market and is deceptive in its pretense to cheapen the cost of living, both to the producer and consumer, therefore be it

Resolved, By the State Board of Agriculture of Pennsylvania and members of the Normal Institute held in joint session in the City of Lancaster, May 23-26, 1911, that we believe it to be for the best interests of Agriculture in Pennsylvania, that this bill be defeated, and that we ask our Senators and Members of the House of Representatives to use their vote and voice against the bill in its present form.

(Signed.)

S. S. BLYHOLDER, Chairman,
R. P. KESTER, Sec'y,
E. B. DORSETT,
PETER GEARHART,
F. D. KERRICK,

Committee.

The CHAIRMAN: What is your pleasure in regard to this report?

MR. GEARHART: I move the adoption of the Report.

MR. RANDALL: I would just like to state, Mr. Chairman, that I consider that a highly drastic measure to be placed upon the minutes, for the reason which I stated before. As far as the agricultural part is concerned, that is all right and it is expressing the opinion of this convention and I have no doubt it will pass with a whirl, but we want to understand that while we are passing this resolution and protecting the wheat and dairy products and all that has been mentioned by any member that has said a word here this morning we are endorsing a high tariff on 200 other articles mentioned in the reciprocity bill and saying that is all right. We are saying to the President that we want to retain the tariff on wood pulp; we are saying that we want to retain the tariff on hemlock lumber thereby making us pay more for hemlock lumber than we ought to pay; and when you pass this resolution that is just exactly what we say. Not only are we denouncing that which is right the agricultural part of it but we are saying that we endorse 200 other articles that go into the poor man's dinner bucket every day and the farmers ought to take that into con-

sideration. It is the poorman to-day the dinner bucket man that is in trouble and it is not the farmer altogether and when we pass this resolution let us pass it understandingly. Let us say to the President that we want this high tariff on wood pulp and lumber and 200 other articles because wheat and dairy products may suffer. Nobody knows they will. Some may say that they are sure it will hurt others have gone so far as to say that it will not hurt at all. But because it may do it we want this wall across the river.

MR. SHOENER: In regards to the lumber, as I understand the bill the tariff is removed on rough lumber and on finished product the tariff is still on. Will that bring the lumber cheaper to the consumer and make the lumber just that much more profitable?

The CHAIRMAN: Is there any amendment to be offered or any remarks on the resolution? The question is called for. In what manner do you wish to vote?

Members: Rising vote.

The motion to adopt the report of the committee was then put and agreed to.

The CHAIRMAN: Is there any other business before the Board? What is your pleasure?

The SECRETARY: Mr. Chairman before we adjourn I want to express the delight I have had in being here this forenoon and express also the regret that I shall not be able to be with you further. I feel that it is not prudent for the head of a department to be absent from the State Capitol during the closing sessions of the General Assembly. I do not know what call there may be made and so I feel that my duty is there. When this meeting was fixed for this date it was supposed that the General Assembly would have adjourned and that is the reason why the Governor cannot be here and that is the reason why it will be impossible for me to remain during the following sessions of the meeting. I am glad to be here this morning and I hope that you will have a pleasant meeting. I shall think of you after I have returned. I feel interested in your work more deeply than I can express.

MR. BLYHOLDER: I want to make this statement to the representatives here. Now you have passed a set of resolutions and no doubt the newspaper representatives here will have them in their papers so that you can get copies of them. Take copies of these resolutions and send them to your members in Congress so that they will come from you personally from the districts they represent and then they will have some weight.

A Member: I think this bill has passed the House and they should be sent to the Senators.

MR. SHOENER: I would like to suggest that the Secretary of Agriculture send a copy of the resolution to each of our United States Senators.

The CHAIRMAN: Is there any other business before the body.

The Secretary has expressed the view that there are a number of us that have to be up at the Legislature to look after the interests entrusted to us. I hope to be with the institute as much as possible, but this is duty, as you people saw yesterday, that you have to be on the job, in looking after appropriations and other things and the laws, the seed bill which is now in conference between the House and Senate, a bill that you endorsed last January at your meeting and was drawn by the Secretary and placed in the hands of Mr. Reel, of Somerset county. This bill has been in the Agricultural Committee and has there been amended and then sent over to the Senate Committee, and there the seed people from all over the United States visited the Capitol and appeared before the Committee, some in favor and some against, and after a lot of deliberation and work the bill then was reported out and passed the Senate with some amendments. It went back to the House for concurrence. The gentlemen who were opposed to certain amendments to the bill asked that the House non-concur and a Committee of Conference was to be appointed. I do not know whether this Committee was appointed yesterday or not. I spoke to the Committee on Agriculture in the Senate and also to two gentlemen in the House who are interested as farmers in the bill, to look after this Committee of Conference. If the Committee of Conference agree why we will have a seed bill. What it will be we cannot tell until after that Conference Committee report, and so we hope that they will agree. There is only one amendment that they seem to be quibbling over at this time and our hope is that they will agree. If they do and the Governor signs it, we will have a very fair bill regulating the sale of seeds such as clover, timothy, alfalfa and other seeds, and we are anxious to get this bill through if possible. And there are other measures to be looked after.

Is there any other business to be brought before this body? If not, we will entertain a motion to adjourn.

MR. TAYLOR: Mr. Chairman, I move we adjourn.

The motion was seconded, put and agreed to.

Whereupon the Board adjourned.

N. B. CRITCHFIELD,
Secretary.

LIST OF COUNTY INSTITUTE MANAGERS FOR THE SEASON OF 1910-11

County	Name and Address of Chairmen
Adams, ...	A. I. Weidner, Arendtsville.
Allegheny, ...	A. J. Purdy, Imperial, R. F. D.
Armstrong, ...	S. S. Blyholder, Kelly Station.
Beaver, ...	A. L. McKibben, New Sheffield.
Bedford, ...	D. W. Lee, Bedford.
Berks, ...	H. G. McGowan, Geiger's Mills
Blair, ...	H. F. Cox, Bellwood.
Bradford, ...	F. D. Kerrick, Towanda.
Bucks, ...	Watson T. Davis, Ivyland.
Butler, ...	N. F. Bartley, Euclid.
Cambria, ...	James Westrick, Patton, Pa., R. F. D. No. 2.
Cameron, ...	W. H. Howard, Emporium
Carbon, ...	Edw. Leinhard, Mauch Chunk, R. F. D. No. 1.
Centre, ...	John A. Woodward, Howard.
Chester, ...	M. E. Conard, Westgrove.
Clarion, ...	J. H. Wilson, Clarion.
Clearfield, ...	Peter Gearhart, Clearfield.
Clinton, ...	Joel A. Herr, Millball.
Columbia, ...	A. P. Young, Milville.
Crawford, ...	J. F. Seavy, Saegerstown.
Cumberland, ...	T. J. Ferguson, Mechanicsburg.
Dauphin, ...	Edward S. Keiper, Middletown.
Delaware, ...	E. J. Durnall, Swarthmore.
Elk, ...	J. B. Werner, St. Marys.
Erie, ...	Archie Billings, Edinboro.
Fayette, ...	T. H. Smith, Dunbar, R. F. D. No. 32.
Forest, ...	C. A. Randall, Tionesta.
Franklin, ...	J. P. Young, Marion
Fulton, ...	J. L. Patterson, McConnellsburg.
Greene, ...	J. W. Stewart, Jefferson.
Huntingdon, ...	G. G. Hutchison, Warrior's Mark.
Indiana, ...	S. C. George, West Lebanon.
Jefferson, ...	Peter B. Cowan, Brookville, R. F. D. No. 4.
Juniata, ...	Matthew Rodgers, Mexico.
Lackawanna, ...	Horace Seamans, Factoryville.
Lancaster, ...	J. Aldus Herr, Lancaster, R. F. D. Edward K. Hibshman, Ephrata.
Lawrence, ...	Sylvester Shaffer, New Castle, R. F. D.
Lebanon, ...	Edward Shuey, Lickdale.
Lehigh, ...	P. S. Fenstermaker, Allentown.
Luzerne, ...	J. E. Hildebrant, Dallas, R. F. D. No. 2.
Lycoming, ...	A. J. Kahler, Hughesville

McKean, ...	O. W. Abbey, Turtle Point
Mercer, ...	Wm C. Black, Mercer.
Miffin, ...	M. M. Naginey, Milroy.
Monroe, ...	F. S. Brong, Saylorsburg.
Montgomery, ...	H. H. Fetterolf, Collegeville.
Montour, ...	J Miles Derr, Milton, Pa., R. F. D. No. 1.
Northampton, ...	C. S. Messinger, Tatamy.
Northumberland, ...	I. A. Eschbach, Milton, Pa., R. F. D.
Philadelphia, ...	J. B. Kirkbride, Bustleton.
Perry, ...	A. T. Holman, Millerstown.
Pike, ...	B. F. Killam, Paupack.
Potter, ...	Horace H. Hall, Ellisburg.
Schuylkill, ...	John Shoener, New Ringgold, R. F. D. No. 1.
Snyder, ...	John S. Kauffman, Middleburg, R. F. D. No. 1.
Somerset, ...	J. C. Weller, Rockwood, R. F. D. No. 2.
Susquehanna, ...	F. A. Davies, Montrose.
Tioga, ...	E. B. Dorsett, Mansfield.
Union, ...	J. Newton Glover, Vicksburg.
Venango, ...	W. A. Crawford, Cooperstown.
Warren, ...	Geo. A. Woodside, Sugargrove.
Washington, ...	D. S. Taylor, Burgettstown.
Wayne, ...	W. E. Perham, Pleasant Mt.
Westmoreland, ...	M. P. Shoemaker, Greensburg.
Wyoming, ...	D. A. Knuppenburg, Lake Carey.
York, ...	G. F. Barnes, Rossville.

LIST OF INSTITUTE LECTURERS FOR SEASON OF 1910-11

Anderson, H. M., New Park, Pa.
 Barnitz, Chas. M., Riverside, Pa.
 Bond, M. S., Danville, Pa.
 Bonsteel, F. E., Bear Lake, Pa.
 Borland, Andrew S., State College, Pa.
 Bruckart, J. W., Lititz, Pa.
 Callahan, E. E., Ferenbaugh, N. Y.
 Campbell, J. T., Hartstown, Pa.
 Card, Fred W., Sylvania, Pa.
 Carter, Miss Arabella, No. 1305 Arch St., Philadelphia, Pa.
 Clark, M. N., Claridge, Pa.
 Coehel, Prof. W. A., State College, Pa.
 Conard, Dr. M. E., Westgrove, Pa.
 Cooke, Prof. Wells W., Department of Agriculture, Washington, D. C.
 Cornman, Chas. T., Carlisle, Pa.
 Cox, John W., New Wilmington, Pa.
 Detrich, Dr. J. D., No. 438 Adams Ave., Scranton, Pa.
 Dorsett, E. B., Mansfield, Pa.
 Drake, W. M. C., Volant, Pa.
 Eschbach, I. A., Milton, Pa., R. F. D. No. 1.
 Evans, H. M., Dillsburg, Pa.
 Fassett, F. H., Meshoppen, Pa.
 Foulke, Mrs. Jean Kane, West Chester, Pa.
 Fulton, H. R., State College, Pa.
 Frear, Dr. Wm., State College, Pa.
 Funk, Dr. J. H., Boyertown, Pa.
 Fox, Cyrus T., Division of Zoology, Harrisburg, Pa.
 Funk, Sheldon W., Boyertown, Pa.
 Goodling, C. L., State College, Pa.
 Gardner, Prof. Frank D., State College, Pa.
 Gregg, J. W., State College, Pa.
 Hibshman, Edw. K., Ephrata, Pa.
 Herr, Joel A., Millhall, Pa.
 Hill, W. F., Huntingdon, Pa.
 Hull, Geo. E., Transfer, Pa., R. F. D.
 Jackson, Prof. Homer T., State College, Pa.
 Kahler, A. J., Hughesville, Pa.
 Kester, R. P., Grampian, Pa.
 Kline, Frank, Spring City, Pa.
 Ledy, J. H., Marion, Pa.
 Lighty, L. W., East Berlin, Pa.
 Lovejoy, Miss Sara C., State College, Pa.
 Mairs, Prof. T. I., State College, Pa.

McCallum, M. H., Wernersville, Pa.
 McCurdy, C. C., Hartstown, Pa.
 McDowell, M. S., State College, Pa.
 Mackintire, W. H., State College, Pa.
 Menges, Prof. Franklin, York, Pa.
 Monroe, Mrs. Geo. E., Dryden, N. Y.
 Murray, D. K., Liverpool, Pa.
 Northup, Henry W., Dalton, Pa., R. F. D.
 Owens, Prof. Wm. G., Lewisburg, Pa.
 Peachey, J. H., Belleville, Pa.
 Phillips, T. J., Atglen, Pa.
 Phillips, E. L., New Bethlehem, Pa.
 Phillippy, Dr. W. T., Carlisle, Pa.
 Rich, Chas. H., Woolrich, Pa.
 Pillsbury, Prof. J. P., State College, Pa.
 Ross, Warren G., State College, Pa.
 Seeds, Robt. S., Birmingham, Pa.
 Shaw, Prof. Chas. F., State College, Pa.
 Stephens, A. Woodward, Mooresburg, Pa.
 Stout, W. H., Pinegrove, Pa.
 Thomas, Miss Sara Phillips, No. 3413 Race St., Philadelphia, Pa.
 Van Noy, Leon Otice, Troy, Pa., R. F. D., No. 66.
 Wagner, F. J., Harrison City, Pa.
 Watts, D. H., Kerrmoor, Pa.
 Watts, Prof. R. L., State College, Pa.
 Weld, R. J., Sugargrove, Pa.
 Wittman, W. Theo., Allentown, Pa.
 Woodman, S. Paul, Rushland, Pa.
 Zeigler, Mrs. Sara B. F., Duncannon, Pa.

MEETING OF THE FARMERS' ANNUAL NORMAL INSTITUTE

PROGRAM

First Session Convenes Tuesday Afternoon, May 23, 1911.

MR. J. ALDUS HERR, Lancaster, Pa., Chairman.

Call to order 1.30.

Address of Welcome, by Mayor Frank B. McClain, Lancaster, Pa.

Response, by Dr. W. T. Phillipy, Carlisle, Pa.

1. "THE PRODUCTION OF SANITARY MILK."

Prof. D. H. Bergey, University of Pennsylvania, Philadelphia, Pa.

2 "ESSENTIALS OF BUTTER MAKING."

Mrs. Jean Kane Foulke, West Chester, Pa.

Note: Governor Tener will be present and address one or more sessions of the Institute.

Tuesday Evening, May 23, 1911.

DR. M. E. CONARD, Westgrove, Pa., Chairman.

Call to order, 7.30.

1. "WHAT IS THE MATTER WITH PENNSYLVANIA FARMERS."

T. D. Harmon, National Stockman and Farmer, Pittsburg, Pa

2 "THE COUNTRY LIFE SITUATION."

Dr. L. H. Bailey, Director, Experiment Station, Cornell University, Ithaca, N. Y.

3 "ADDRESS."

Dr. Thomas F. Hunt, Dean, Experiment Station, State College, Pa.

Wednesday Morning, May 24, 1911.

MR. J. W. STEWART, Jefferson, Pa., Chairman.

Call to order 9.30.

1. "HANDLING OF THE APPLE CROP."

Chester A. Tyson, Floradale, Pa.

2. "A FORTUNE IN 15 YEARS, AND FRUIT THE FACTOR."

Dr. J. H. Funk, Boyertown, Pa.

3. "HORTICULTURE: PAST, PRESENT AND FUTURE."

W. W. Farnsworth, Waterville, Ohio.

Wednesday Afternoon, May 24, 1911.

MR. G. F. BARNES, Rossville, Pa., Chairman.

Call to order 1.30.

"THIS SESSION WILL BE DEVOTED TO GENERAL DISCUSSION FOR
THE DEVELOPMENT OF QUESTIONS RELATING TO THE INSTI-
TUTE WORK THROUGHOUT THE STATE."

Opened by Hon. A. L. Martin, Director of
Institutes, Harrisburg, Pa.

Note: It is expected that County Chairmen of Institutes and Lecturers will pre-
pare written questions relating to the improvement of the work.

Wednesday Evening, May 24, 1911.

DR. T. J. FERGUSON, Mechanicsburg, Pa., Chairman.

Call to order 7.30.

1. "THE POULTRY INDUSTRY."

Prof. James E. Rice, in Charge Poultry
Husbandry, Cornell University, Ith-
aca, N. Y.

(Illustrated with lantern slides.)

2. "FARM MANAGEMENT."

Prof. D. A. Brodie, Acting Agriculturist,
Bureau of Plant Industry, Dept. of
Agriculture, Washington, D. C.

(Illustrated with lantern slides.)

Thursday Morning, May 25, 1911.

B. F. KILLAM, Paupack, Pa., Chairman.

Call to order 9.30.

1. "NEEDS OF RURAL SCHOOLS."

Miss Sara C. Lovejoy, State College, Pa.

2. "SOME LESSONS WE SHOULD TEACH."

R. P. Kester, Grampian, Pa.

3. "THE PRESENT TREND OF AGRICULTURAL EDUCATION."

Prof. L. A. Clinton, Director, Experiment Station, Storrs, Conn.

4. "COUNTRY SCHOOLS FOR FARM LIFE."

Prof. Thos. I. Mairs, State College, Pa.

Thursday Afternoon, May 25, 1911.

J. MILES DERR, Milton, Pa., Chairman.

Call to order 1.30.

1. "COMMON DISEASES OF LIVESTOCK."

Dr. C. J. Marshall, State Veterinarian, Harrisburg, Pa.

2. "CULTIVATION AND HARVESTING OF TOBACCO."

(Illustrated.)

E. K. Hibshman, Ephrata, Pa.

3. "MARKET GARDENING."

M. H. McCallum, Wernersville, Pa.

Thursday Evening, May 25, 1911.

MRS. SARAH B. F. ZEIGLER, Duncannon, Pa., President.

Call to order at 7.30.

1. "GLEANINGS FROM OTHER COUNTRIES."

Miss Sara Phillips Thomas, No. 3413 Race St., Philadelphia, Pa.

2. "FARM SANITATION."

Mrs. Geo. E. Monroe, Dryden, N. Y.

3. "A THREE-COURSE DINNER." (Demonstrated with actual cooking.)

Mrs. Anna B. Scott, Domestic Science Bureau, Philadelphia, Pa.

Friday Morning, May 26, 1911.

HON. H. G. MCGOWAN, Geiger's Mills, Pa., Chairman.

Call to order 9.30.

1. "REPORT OF RESOLUTION COMMITTEE."

2. "VISITING POINTS OF INTEREST IN CITY AND COUNTY."

Closing Remarks and Adjournment.

PROCEEDINGS OF THE FARMERS' ANNUAL NORMAL INSTITUTE, HELD IN THE COURT HOUSE, LANCASTER, PA., MAY 23-26, 1911.

Tuesday, May 23, 1911, 1.30 P. M.

Mr. J. Aldus Herr, Lancaster, Lancaster county, Pa., in the Chair.

The CHAIRMAN: Ladies and Gentlemen, it affords me quite a pleasure to preside over the first session of a Farmers' Annual Normal Institute ever held in Lancaster county. This is the first one that has ever been held here, and I hope we will come here again. I have the pleasure now of introducing to you Mayor McClain, of Lancaster, who will welcome you to the town.

ADDRESS OF WELCOME.

By HON. FRANK B. McCLAIN, Lancaster, Pa.

Mr. Chairman: I have come here not to make a speech as you might perhaps expect. I have come here not as a teacher, but as a student to listen and to learn of the great science of agriculture from those competent to instruct in it. There is a little maxim which says, "He who by the plow would drive must either hold themselves or drive." I have neither held nor have I driven, and the information that I possess concerning agriculture, therefore, has not come to me through holding the plow. I have, however, had some experience with a certain branch of agriculture covering a great many years. I refer to the cattle growing and cattle feeding industry. But under existing market conditions, a dissertation upon that subject at this time would mean, in view of the experience I have had as well as some of the gentlemen sitting near me feeding cattle this winter, would be to them a somewhat harrowing tale, I fear.

It would be a superfluity for me to tell a body of intelligent, practical farmers like you that Lancaster county for a good many years has enjoyed the proud distinction of occupying the place of No. 1 among, not only the counties of Pennsylvania, but as well the counties of the United States in the annual value of her farm products. This has been true not so much because of the superior quality of our soil, but we feel because of the superior quality of the people who have tilled the soil. There are fair lands to westward which possess a far richer and deeper loam than does the soil of Lancaster county. It is true that their lands are not peopled so extensively as ours, but

it is also true that to them has not been applied the same intensive application of human energy as has been applied to the soil of Lancaster county by its sturdy sons.

One thought suggested to me—it may not be a popular thought with you gentlemen and I may be entirely wrong in my surmise—but it seems to me that in these days the tendency is to run too much to machine farming. After all it is not the number of machines you may use upon the farm, but the character of your soil which produces that crop. It is the personality and the willingness to do work of the farmer. I do not mean to decry the use of these labor saving devices. Many of them in use to-day are very helpful. But I contend that the unlimited use of machinery upon farms has a tendency to instill the idea that crops can be grown and harvests can be gathered without the laying on of hands, without the employment of the tools which Nature intended should be used in conjunction with hers to be the most effective agency in crop production. Criticism is frequently heard that the farmers of Lancaster county are not quite as progressive as farmers of some other sections. This probably is true if the comparison is to be based upon the number and kinds of machinery of every character employed by the Lancaster county farmers, but the comparison becomes ridiculous when the results here are compared with the results achieved by those who criticise Lancaster county. And the reason that we do achieve so in contradistinction to the achievements of farmers in other sections of the country where their soil is as good is because here, as I said before, we think we have intelligent, earnest application of human energy joined with scientific methods. And it is this fact, coupled with the native thrift, that has made the Lancaster county farmer the most prosperous of his kind not only throughout Pennsylvania, not only throughout the United States, but the world over.

Meetings such as you are holding here to-day do much to advance the cause of agriculture. They furnish opportunity for exchange of opinions, presentation of new ideas and the formulation of more effective methods of treating the soil and growing crops. You did wisely in selecting Lancaster for your place of meeting, accessible as it is from all points of the compass. To you who have come here from a distance, I say welcome, and whether you be from near or far I here now extend to you the greetings of welcome to the city of Lancaster.

The CHAIRMAN: The next is the response by Dr. W. T. Phillipy, of Carlisle, Pa.

RESPONSE TO ADDRESS OF WELCOME.

By DR. W. T. PHILLIPY, Carlisle, Pa.

Mr. Chairman, Honorable Mayor, Ladies and Gentlemen: I assure you that it affords me a great deal of pleasure to respond in your behalf to the pleasant words of greeting and welcome that have been

extended to us as we gather here in our Annual Normal Institute this afternoon. My friends, I know that we feel already that we are welcome in your city of Lancaster and in this great County of Lancaster which is a part of the great Commonwealth that is represented here to-day. I know that we have all heard of Lancaster county. We hear of Lancaster county it does not matter what part of the State we are in. There is always someone will say: "Have you ever been to Lancaster county? Have you ever passed through it? Have you ever had the privilege or opportunity of viewing its rich green fields as you passed down over the Pennsylvania Railroad?" I want to say to you, my friends, and the Honorable Mr. Mayor, that it has been my privilege to be in this county a number of times. I have had the pleasure and privileges of appearing at institutes and I know from the interest that was manifested there and the class of people that we were called upon to talk to at Lancaster county is progressive. Its citizens are awake to the opportunities that are presenting themselves, and they are making the best of these opportunities upon their farms.

My friends, it has been so well said and so much better than I can say it, Lancaster county has been the foremost county not only in this Commonwealth of ours, which we are also proud of to-day, but as well the banner county of the United States in its annual production of farmers' products. I know that you will agree with me, that we were glad to accept the kind invitation to come over here to hold this Normal Institute in this beautiful city. It has been my privilege to visit parts, its colleges, its public schools and some of its great charitable institutions as well as it has been to travel over this county, over its railroads and its trolley system and view these rich and fertile fields of Lancaster county and I know, my friends, before you get away from our meeting that you will have the opportunity, if you have not already had it, of seeing some of the fertile farms that are lying around the City of Lancaster. Now, my friends, I want to plead with our good Mayor this afternoon in your behalf. You know when we get away from home we sometimes may step out of the path that is laid down and I want to plead with you, Mr. Mayor, if any of them may be brought before you, please be easy.

THE MAYOR: Please say to the visiting delegates that I have instructed the policemen to show them every consideration.

DR. PHILLIPY: Just last evening, I do not know who would advertise our coming to this city, but I have a good friend from the western end of the State and he came into the City of Lancaster last night. I am not going to tell you his name, but I will tell you he belongs to the "duck" family, and he went into one of the prominent hotels and said to the proprietor: "What are your rates here?" And the proprietor said two dollars and up. And my friend said: "Well, sir, I am an institute lecturer of the State of Pennsylvania." The proprietor said: "I am glad to meet you sir. Then it is two dollars down." Now I suppose that somebody had advertised our coming here, but I hope that there will be nothing more serious than that. I just want to tell you a little incident that happened last evening. We all have a good friend from Pennsylvania and he comes from Allentown, but I am not going to tell his name, but he is a chicken man.

He is recognized all over the State and not only in the State of Pennsylvania but throughout this great country of ours. We were coming up street last night and he met a gentleman who said to him: "My friend, the next time you send me any chickens don't send me any of your airplane kind." Well, I thought that was something new, and I waited for developments. And my friend said: "What do you mean?" And the gentleman said: "The last chickens you sent me were all wings and machinery and there was no meat on them." I hope he will get through this week without arrest or anything of that kind. But my friends, you have heard and you all enjoyed the address of welcome that our good friend has extended to us, and we are here this week to enjoy the instruction that will be given to us in the different sections of this institute and I feel that it would be folly for me to waste my words this afternoon in trying to say anything further; but I want to say in behalf of our friends who have assembled here, Mr. Mayor, that we thank you very kindly for the warm and hearty welcome that you have extended to us during this meeting, and I hope that we all, one and all will be able to say when we go away from here that we have had not only a profitable week but a week of pleasure and you will not be afraid or ashamed to ask us back sometime in the future.

The CHAIRMAN: This will be followed by a roll-call of County Institute Managers and then a roll-call of Institute Lecturers.

The results of these roll-calls and subsequent registrations were as follows:

COUNTY INSTITUTE MANAGERS PRESENT.

County.	Name and Address of Chairman.
Adams	A. I. Weldner, Arendtsville.
Allegheny, ...	A. J. Purdy, Imperial.
Armstrong	S. S. Blyholder, Kelly Station.
Berks, ...	H. G. McGowan, Geiger's Mills.
Blair, ...	Dr. W. Frank Beck, Altoona.
Bradford, ...	F. D. Kerrick, Towanda.
Bucks, ...	Watson T. Davis, Ivyland.
Butler, ...	W. H. Milliron, Euclid.
Carbon, ...	Edw. Leinhard, Mauch Chunk.
Centre, ...	John A. Woodward, Howard.
Chester, ...	M. E. Conard, Westgrove.
Clarion, ...	J. H. Wilson, Clarion.
Clearfield, ...	Peter Gearhart, Clearfield.
Clinton, ...	Joel A. Herr, Millhall.
Columbia, ...	A. P. Young, Millville.
Crawford, ...	J. S. Patton, Hartstown.
Elk, ...	John G. Schmidt, St. Marys.
Erie, ...	Archie Billings, Edinboro.
Fayette, ...	T. H. Smith, Dunbar.

Forest, ...	C. A. Randall, Tionesta.
Franklin, ...	J. P. Young, Marion.
Fulton, ...	J. L. Patterson, McConnellsburg.
Greene, ...	J. W. Stewart, Jefferson.
Huntingdon, ...	G. G. Hutchison, Warrior's Mark.
Indiana, ...	S. C. George, West Lebanon.
Juniata, ...	Matthew Rodgers, Mexico.
Lackawanna, ...	Horace Seamans, Factoryville.
Lancaster, ...	J. Aldus Herr, Lancaster.
	Edward K. Hibshman, Ephrata.
Lawrence, ...	Sylvester Shaffer, New Castle.
Lebanon, ...	Edward Shuey, Lickdale.
Luzerne, ...	J. E. Hildebrant, Dallas.
Lycoming, ...	A. J. Kahler, Hughesville.
McKean, ...	O. W. Abbey, Turtle Point.
Mifflin, ...	M. M. Naginey, Milroy.
Monroe, ...	F. S. Brong, Saylorsburg.
Montgomery, ...	J. H. Schultz, Norristown.
Montour, ...	J. Miles Derr, Milton.
Northampton, ...	C. S. Messinger, Tatamy.
Northumberland, ...	I. A. Eschbach, Milton.
Philadelphia, ...	J. B. Kirkbride, Bustleton.
Perry, ...	A. T. Holman, Millerstown.
Pike, ...	B. F. Killam, Paupack.
Schuylkill, ...	John Shoener, New Ringgold.
Somerset, ...	J. C. Weller, Rockwood.
Tioga, ...	E. B. Dorsett, Mansfield.
	Calvin H. Dewitt, Mansfield.
Union, ...	J. Newton Glover, Vicksburg.
Venango, ...	W. A. Crawford, Cooperstown.
Warren, ...	Geo. A. Woodside, Sugargrove.
Washington, ...	D. S. Taylor, Burgettstown.
Wayne, ...	W. E. Perham, Pleasant Mount.
York, ...	G. F. Barnes, Rossville.

INSTITUTE LECTURERS PRESENT.

Barnitz, Chas. M., Riverside, Pa.
 Bond, M. S., Danville, Pa.
 Bonsteel, F. E., Bear Lake, Pa.
 Borland, Andrew S., State College, Pa.
 Bruckhart, J. W., Lititz, Pa.
 Campbell, J. T., Hartstown, Pa.

Card, Fred. W., Sylvania, Pa.
 Carter, Miss Arabella, Philadelphia, Pa.
 Clark, M. N., Claridge, Pa.
 Cochel, Prof. W. A., State College, Pa.
 Conard, Dr. M. E., Westgrove, Pa.
 Cooke, Prof. Wells W., Dept. of Agriculture, Washington, D. C.
 Cornman, Chas. T., Carlisle, Pa.
 Dorsett, E. B., Mansfield, Pa.
 Drake, W. M. C., Volant, Pa.
 Eschbach, I. A., Milton, Pa.
 Fassett, F. H., Meshoppen, Pa.
 Foulke, Mrs. Jean Kane, West Chester, Pa.
 Frear, Dr. Wm., State College, Pa.
 Funk, Sheldon W., Boyertown, Pa.
 Hibshman, Edw. K., Ephrata, Pa.
 Herr, Joel A., Millhall, Pa.
 Hull, Geo. E., Transfer, Pa.
 Kahler, A. J., Hughesville, Pa.
 Kester, R. P., Grampian, Pa.
 Lighty, L. W., East Berlin, Pa.
 Lovejoy, Miss Sara C., State College, Pa.
 Mairs, Prof. T. I., Etate College, Pa.
 McCallum, M. H., Wernersville, Pa.
 McCurdy, C. C., Hartstown, Pa.
 McDowell, M. S., State College, Pa.
 Menges, Prof. Franklin, York, Pa.
 Monroe, Mrs. Geo. E., Dryden, N. Y.
 Northup, Henry W., Dalton, Pa.
 Peachey, J. H., Belleville, Pa.
 Phillips, T. J., Atglen, Pa.
 Phillips, E. L., New Bethlehem, Pa.
 Phillipy, Dr. W. T., Carlisle, Pa.
 Rich, Chas. H., Woolrich, Pa.
 Ross, Warren G., State College, Pa.
 Seeds, Robt. S., Birmingham, Pa.
 Stephens, A. Woodward, Mooresburg, Pa.
 Stout, W. H., Pinegrove, Pa.
 Thomas, Miss Sara Phillips, Philadelphia, Pa.
 Van Noy, Leon Otice, Troy, Pa.
 Wagner, F. J., Harrison City, Pa.
 Watts, D. H., Kerrmoor, Pa.
 Weld, R. J., Sugargrove, Pa.
 Wittman, W. Theo., Allentown, Pa.
 Woodman, S. Paul, Rushland, Pa.
 Zeigler, Mrs. Sara B. F., Duncannon, Pa.

DEPUTY SECRETARY MARTIN: In addition to these roll-calls, members representing all farmers' organizations, farmers' clubs, unions, granges, all kindred organizations, horticultural societies of various kinds are welcome to these meetings and have the privilege of the floor. There is not much voting here and that is the only thing you would be excluded from. If there are representatives of any of the societies named or any other societies representing agriculture present please hold up your hands so that we get your name on the register. From time to time will the members of this institute see to it that our secretary gets a list of those people who will no doubt come in at subsequent sessions of this institute in order that we may procure a complete list of attendants.

The CHAIRMAN: We will now proceed with the regular program. The first will an address on "The Production of Sanitary Milk" by Prof. D. H. Bergey of the University of Pennsylvania, Philadelphia. We had hoped at this time that the Board of Health of Lancaster would be here. Here is their opportunity. I now have the pleasure of introducing to you Prof. Bergey.

PROF. BERGEY: I wish to state before beginning my address that I am not a dairyman; I am not a milkman, nor a farmer. I was born and raised on the farm. I have been a user of milk and I have examined milk in the laboratory for a number of years, so that I feel that I have some knowledge of the sanitary production of milk.

Prof. Bergey then delivered his address as follows:

THE PRODUCTION OF SANITARY MILK.

By D. H. BERGEY, M. D., *University of Pennsylvania.*

By sanitary milk we understand a milk that is free from extraneous things of whatever kind that may affect the health of those using it. The production of sanitary milk is not a difficult matter at all, although it requires constant vigilance on the part of the producer and attention to a great many details. Bacteria are found in the milk ducts of most cows and, subsequently, it is impossible to obtain considerable quantities of milk without the admixture of bacteria. The bacteria in the milk ducts of apparently healthy cows are principally those who are concerned in the natural souring of milk. These bacteria are, therefore, regarded as normal constituents of milk.

The most common organism found in freshly drawn milk is micrococcus lacticus. In many of its characters this bacteria resembles micrococcus aureus, which is the most frequent cause of pus formation in man and domestic animals. Another organism found in freshly drawn milk is streptococcus lacticus. This bacterium is not easily

distinguishable from streptococcus pyogenes, another of the bacteria causing pus formation. These two organisms found in the milk sinews of apparently healthy cows appear, from the effects which they produce in milk, to be normal inhabitants of this portion of the cow's udder and, therefore, have no hygienic significance.

Milk may be said to be contaminated with bacteria when it contains organisms which differ from those mentioned. The contaminating bacteria may be derived from a variety of sources. The principal sources of contamination of milk in the course of production and marketing are to be sought in the dairy itself. The chief sources of contamination are the cow from which the milk is obtained; the stable; the bedding; the fodder; the milker or the utensils in which the milk is collected.

The cow may be the source from which contaminating organisms are derived and these organisms may gain access to the milk because the animal is ill and the bacteria causing the disease are given off with the milk; or second, the contamination may be derived from the fur of the cow or from a dirty udder.

Cows do not suffer from many diseases to which human beings are also liable. The principal diseases that may be disseminated from the cow to the consumer through the milk are the various types of inflammation of the udder giving rise to disturbances of the digestive organs in those using the milk; tuberculosis; foot and mouth disease; and very exceptionally diphtheria and anthrax. Cows suffering from tuberculosis usually give off considerable numbers of the tubercle bacillus, even though the disease is located in some other part of the animal's body than the udder.

The controversy which has continued for some years as to whether tuberculosis of cows is transmissible to human beings remains unsettled. In 1901 Koch contended that bovine tuberculosis was not transmissible to man. Since then there have been so many cases of tuberculosis, especially in children, in which the bovine variety of the tubercle bacillus was found, that it appears wise to regard the bovine type of the disease as a distinct menace to man. Foot-and-mouth-disease is transmissible to man through the milk. As we have not yet discovered the causative agent of this disease, we cannot make any definite statements concerning its transmission to man. There is abundant circumstantial evidence in support of the opinion that diphtheria may be disseminated through milk. Usually the milk is found to have been contaminated by persons who suffer from a mild form of this disease, or who are in intimate contact with cases. Klein, of England, has long contended that cows may suffer from diphtheritic infection with lesions on the udder. However, it has remained for Dean and Todd to show definitely that this form of infection in cows is possible, and that those who consume the milk in an uncooked state are liable to contract the disease. Anthrax is a highly infectious disease and there is a possibility of its transmission to man through the use of milk. There are no authentic cases of such transmission on record, but every precaution should be taken to exclude the milk of infected dairies.

The bacteria derived from the fur of the cow or from a dirty udder are principally those found in the excrement of the animal. These bacteria cause decomposition and putrefaction of the milk, and, in

this way, render it unfit for consumption, or, at least, change its character to such an extent as to make it dangerous to the consumer.

The contamination of milk through bacteria derived from the fur of the animal and from the udder could be obviated to a considerable degree by careful attention to cleanliness of the cow. Currying and brushing the cows serves to remove adherent filth and loose hair. The cows should be cleaned some time before milking is begun in order to allow the dust to settle. Washing the udder and flanks of the cow previous to milking aids in reducing the number of bacteria that may be dislodged and gain access to the milk. While in a moistened state bacteria are not distributed very freely. It is only when the fur of the animal is dry that the bacteria are easily dislodged.

The stable is an important source of contamination of the milk and is a factor which has by no means received the attention which it merits. The type of barn found on many farms does not make it possible to stable cattle under the very best conditions. The amount of space allotted to each animal is insufficient to provide the requisite amount of ventilation. A human being requires about three thousand cubic feet of fresh air per hour and, in order to supply this amount of fresh air in dwellings, about one thousand cubic feet of space should be allotted to each individual. The cow is a much larger animal and requires proportionately larger quantities of fresh air. In the main it may be stated that a cow requires at least a quantity of fresh air equal to that needed by an average person; and, in order that this amount of fresh air may be supplied regularly without the production of drafts, the amount of space allotted to a cow should be, in proportion to her size, one thousand to twelve hundred cubic feet. Many of the stables in older barns are too low to make it possible to bring about satisfactory ventilation, though an undue height of stable is also undesirable. It may be stated that a height of ten to twelve feet is a fair average.

With proper allotment of space and satisfactory provision for ventilation in stables, the purity of the air can be more readily maintained; and where pure air prevails one of the principal sources of contamination in the stable, that is, dust, can be largely eliminated, because the smaller the stable and the greater the overcrowding, the greater the amount of dust floating in the air, and this dust finds its way into the milk during the process of milking.

The dust of stables is a fruitful source of bacteria which cause decomposition and putrefaction in milk. The dust particles and the bacteria adherent to them are derived from the cows, the bedding, the fodder, and the attendants. For this reason, the nature of the bedding and the time of feeding play an important part in the production of sanitary milk. Straw bedding contains a greater number of bacteria than do peat or shavings.

The handling of fodder during the time of milking disseminates large quantities of dust, a considerable portion of which finds its way into the milk, and, for this reason, it is customary to recommend that feeding time and milking time should be separated so as to avoid as much as possible this source of contamination. The nature of the bacteria derived from fodder is similar to that of the bacteria derived from bedding.

The following table, compiled from the experiments of Backhaus of Königsberg, will show the possible sources of contamination at a glance:

TABLE I.

Elements of Contamination.	Sources of Contamination.	Bacteria.
1. Infection, -----	Fresh milk, -----	6,660 per c. c.
	After passage through six vessels, -----	97,600 per c. c.
2. Bodily cleanliness, -----	Milk from clean cow, -----	20,600 per c. c.
	Milk from dirty cow, -----	170,000 per c. c.
3. Litter, -----	Peat, -----	2,000,000 per gm.
	Good straw, -----	7,500,000 per gm.
	Bad straw, -----	10,000,000 per gm.
4. Influence of the litter on the number of bacteria in milk.	With peat litter, -----	8,500 per c. c.
5. Food (dust of, in the byre), -----	With straw litter, -----	7,330 per c. c.
	Oil cake, -----	457,500 per gm.
6. Milking, -----	Bran, -----	1,361,000 per gm.
	Milked dry, -----	5,600 per c. c.
	Milked wet, -----	9,000 per c. c.
	First milk, -----	10,400 per c. c.
	Last milk, -----	Sterile.
	Washed udder, -----	2,200 per c. c.
	Unwashed udder, -----	3,500 per c. c.
7. Vessels, -----	Enamelled vessel, -----	1,106 per c. c.
	Tin vessel, -----	1,680 per c. c.
	Wooden vessel, -----	279,000 per c. c.
8. Cleaning of vessels, -----	Sterilized pail, -----	1,300 per c. c.
	Simply rinsed, -----	28,600 per c. c.

The milker is undoubtedly a source of contamination, especially so if wet milking is permitted. However, the clothing of the milker, if not clean, is also a source of contamination. Strict cleanliness of the hands of the milker and of his clothing will help to eliminate an important source of contamination. The milker may also contribute disease producing bacteria if he is suffering from some of the communicable diseases, or if he has been in attendance on persons suffering from such diseases. The diseases which may be communicated by the milker are: tuberculosis, diphtheria, scarlet fever, and typhoid fever. No one suffering from, or associating with, persons suffering from any of these diseases should be permitted to take part in the production of milk.

Dirty utensils are also a fruitful source of contamination, and it is quite a task to keep the milking utensils in proper condition of cleanliness to prevent this kind of contamination. Utensils that have been cleaned with soap and hot water, or some other reliable cleansing material, and then scalded, are relatively free from bacteria which are injurious to the milk. They can be made absolutely free from bacteria by subjecting them to a sterilizing process.

The following tables give some indication of the extent to which bacteria are contributed to normal milk during ordinary procedures, especially where the milk is strained and cooled through apparatus that is not sterilized:

TABLE II.

Bacteriological Examination of Milk Derived From Separate Cows in Ordinary Dairies; Samples Collected at Various Stages of the Process of Milking and Cooling.

No.	Udder.	Bucket.	Strainer.	Cooler.	Can.	Bottler.
1, -----	100	350	23,650	120,400	-----	-----
2, -----	25	1,250	21,225	508,200	-----	-----
3, -----	0	75	-----	-----	4,050	-----
4, -----	0	325	-----	16,200	-----	-----
5, -----	400	850	60,900	34,550	173,800	84,000

TABLE III.

Influence of Unclean Apparatus Upon the Bacteria Content of Milk.

Dairy No.	Straining Apparatus.			Cooling Apparatus.		
	Beginning.	50 quarts.	100 quarts.	Beginning.	50 quarts.	100 quarts.
1, -----	21,225	12,800	1,375	508,200	21,700	2,600
2, -----	4,800	1,685	-----	15,950	2,900	-----
3, -----	14,925	12,325	-----	1,700	8,800	-----

The type of milk pail employed in milking is also a matter of importance. Several types of pail are in common use and I have had no personal experience in testing their efficiency; but those who have studied this question are generally agreed that some form of pail with the top partly covered in is much better than the old type of pail which is open. The pail with visor used in the dairy department of Cornell University serves the purpose of limiting the amount of dust falling in the milk. The shape and size of the visor has been slightly changed by Professor Harding of Geneva.

The milk should be cooled as soon as possible and kept at a low temperature (about 50 degrees Fahrenheit) until consumed. At a low temperature the bacteria in the milk do not multiply rapidly, but at higher temperatures they multiply quickly; for instance, at the body temperature, a single organism may produce as many as 200 in three hours; 10,000 in six hours; 10,000,000 in nine hours, and 2,000,000,000 in eighteen hours. Conn has shown that at 50 degrees Fahrenheit bacteria multiply five times in twenty-four hours, while at 70 degrees Fahrenheit, they multiply seven hundred and fifty times.

These bacteria develop at the expense of the chemical constituents of the milk and produce alterations in the character of the milk far

in excess of what is indicated by the mere increase in numbers. In order to keep the number of bacteria as low as possible, milk must be shipped in refrigerator cars, or packed in ice.

Sanitary milk, it will be seen from what has already been said, is simply clean milk obtained from healthy cows and maintained under proper hygienic conditions. Sanitary milk cannot be produced in unsanitary dairies, and, even though it may be in a sanitary condition when collected, if not marketed under proper conditions it will not reach the consumer in a satisfactory state.

It will be necessary, therefore, in order that the consumer may be supplied with sanitary milk, that extreme precautionary measures be carried out not only on the farm in collecting the milk but that the measures be extended all along the line from the farm to the consumer, so that milk that is in a satisfactory condition as collected may maintain that state until it is to be used. It is an encouraging fact that recently transportation companies have announced that they are ready to supply refrigerator cars for the transportation of milk, and through this means it will be possible to allay a great deal of the criticism of the methods employed in conducting dairies that should have been directed against methods of transportation.

The CHAIRMAN: We will now give a few minutes to the discussion of the question. It matters not whether it be a member or not. Please do not forget that it is the discussion of the subjects that makes the meeting. We will be glad to have you ask the Professor any questions bearing on the subject.

DEPUTY SECRETARY MARTIN: You spoke of the cleansing of dairy utensils. What would you regard as a most economical and practical method to be adopted by dairymen for cleansing the dairy vessels?

PROF. BERGEY: Any bacteriologist will view cleanness in a different light from what ordinary people view it. When I spoke of clean vessels, of course, I have in mind vessels which contain no bacteria. Now that is out of the question for the ordinary dairyman. He is not equipped with apparatus that will enable him or permit him to sterilize his vessels. The ordinary method used in washing with soap and water and scalding with boiling water will reduce enormously the number of bacteria that will subsequently appear otherwise. If allowed to dry and drain in such a way that dust will not fall into them it will be a satisfactory condition and yield a milk that will be free from at least an unreasonable dirt and these extraneous bacteria.

A Member: Do you say that it is possible to destroy the entire bacteria?

PROF. BERGEY: Oh, no; I would not convey that idea at all. Our cleaning methods as employed in wholesale places removes a great many of the bacteria but don't by any means destroy all of them.

A Member: But the most approved methods, with the most approved conditions of equipment, will that method destroy all?

PROF. BERGEY: Where you sterilize, of course, you destroy all the bacteria.

A Member: Would that be costly?

PROF. BERGEY: Yes, it would be costly.

A Member: How, with steam?

PROF. BERGEY: Put the steam into the vessels, the steam is turned into the chamber and retained there. That means you have to have a boiler; but very good milk can be produced without going to that expense, sanitary milk, according to my idea.

A Member: Is it possible for ordinary tuberculosis to enter the milk duct, or tuberculosis of the bone to enter the milk duct?

PROF. BERGEY: As I understand it the ordinary tuberculosis of a cow or bone tuberculosis of a cow would mean that that cow would give off tuberculin with the milk. That is the meaning you have in mind? It has been found by bacterial studies of milk that in tuberculosis in remote parts of the body tubercular bacteria can be admitted to the milk without lesion of the udder. Whether this is commonly the case we cannot say but it is believed possible and any animal with tuberculosis should be regarded as a source of danger no matter in what part of the body the lesions may be located.

A Member: At what temperature will the bacteria stop multiplying in the milk?

PROF. BERGEY: Some continue to multiply as low as freezing point. You get a few that multiply at a point as low as freezing. Prof. Conn made a study of the rate of multiplying of bacteria at different temperatures and two tests stand out very prominent as indicating how rapidly they grow. At 50 degrees he found that bacteria multiplied seven times in 24 hours; at 70 degrees Fahrenheit, 750 times in 24 hours. So if you bring the temperature of milk down to 50 degrees, the requirement of some of the large cities, you limit the rate of multiplication enormously. You don't overcome it altogether because they will go on and multiply slightly. The higher the temperature up to a certain point the more rapid the rate of multiplication.

A Member: How about smallpox?

PROF. BERGEY: We don't know anything about the cause of smallpox. We cannot cultivate the organisms of smallpox. We believe it to be transmitted through milk if the milk is in contact with people having smallpox, by the germs getting access to the milk, but we cannot recover from the milk.

DR. CONARD: Have you the rate of multiplication of bacteria in your mind?

PROF. BERGEY: Prof. Conn, of Middletown, Conn., found that at 50 degrees bacteria multiplied 7 times in 24 hours; at 70 degrees Fahrenheit, at the rate of 750 times in 24 hours.

The CHAIRMAN: I would like to ask you a question. The milk that comes to Lancaster is shipped by trolley and comes probably a distance of 4, 8, 10 or 12 miles. What conditions ought we have or ought the producer have to produce what you would call sanitary milk? What condition about his stable before it leaves the farm? That is the part that we are interested in. There is a movement, as I understand it, to get better milk to Lancaster and we as producers wish to meet that if it is reasonable. How are we to meet it?

PROF. BERGEY: The conditions on the dairy farm, of course, will influence very largely the character of the milk coming from that farm. Taking for granted that the milk is obtained from healthy cows, the surroundings in the stable and in the milkhouse will influence the number of bacteria getting access to the milk. If the stable is dirty, if the cows are dirty, then, of course, that milk is bound to have large numbers of bacteria immediately after it is withdrawn from the cow.

The CHAIRMAN: We understand that part, but what are we to do? How are we to get at it?

PROF. BERGEY: That is a question that I hardly think I am capable of answering. I would suggest if possible that the farmer would be educated to the point to see that it would be an advantage to him to have the proper degree of cleanness on his place. If a man exercises greater care, if he expends a little more money than his neighbor and produces a better product he should be paid a better price; and I think that you can educate the farmer to the point that he will be in a position to demand a better price and will be willing to take that extra care, if he knows how. If he does not know how, there are places to learn how to manage his dairy in such a way that he can keep down these sources of contamination in his milk. Just how to manage it I hardly think I am capable of answering.

A Member: Are the people of Philadelphia willing to pay the price if we go to the expense to produce better milk?

PROF. BERGEY: I think the men who will furnish certified milk will find a very ready market. They are hardly able to meet the demand. I think the demand for a first class clean milk can be created by clean milk and will constantly increase. The people are being educated in Philadelphia to that point. We are having a milk exhibit in Philadelphia. We are holding a dairy exhibit in Philadelphia during this week and I feel sure that that will stimulate the demand for clean milk.

A Member: You say the railroads are putting on refrigerator cars.

PROF. BERGEY: I say it is announced that they are ready to supply them.

A Member: They are demanding more freight, putting on the farmer all the toll. As soon as you say higher prices for milk, it is a point they are trying to squeeze the poor man. You want the farmer to go to work and make more expense in stabling and help to produce the milk and pay for it to go there and they are not willing to pay the price.

PROF. BERGEY: I think this agitation and education we are having in Philadelphia will help to bring the newspapers over to the farmer's side. I think the great majority of the intelligent public will see that the farmer's demand for higher prices is a just one if he goes to that expense to produce good milk.

A Member: It is just these articles in the newspaper that are hurting the farmer, demanding better milk and not willing to pay the extra cost of producing it. They are squeezing the poor man out of his milk.

PROF. BERGEY: I think the time is coming when it will be changed. I feel sure that this educational meeting we are having will be a benefit not only to the people of Philadelphia in getting a better milk supply, but makes it possible to charge a greater price for a satisfactory milk.

A Member: I would like to ask if the average farmer producing milk will wash his pail night and morning and in the morning turn them up so that they will drain out and turn them to a window to the south and allow the sunlight to shine in the window on them, will that sterilize them?

PROF. BERGEY: That will go far towards sterilizing the pail. Exposure to direct sunlight kills bacteria very quickly. Ten or fifteen minutes exposure will kill many bacteria.

A Member: Will that go as far as scalding hot water?

PROF. BERGEY: Probably farther.

A Member: It would be a good thing to do because it would be very cheap and something very practical to do.

PROF. BERGEY: If the pails are placed in such a position and protected against dust, direct sunlight would have a sterilizing effect. We demonstrate that very easily in the laboratory how effectively the sunlight acts. It does not act on the fluid; has no penetrating power below the surface; but you have the bacteria on the surface and that would be efficacious. Of course, you could not make it come in play all the time because the sun is not shining all the time.

A Member: In case the farmers in many cases have arrangements to make some steam to help out, and they are coming to that rapidly; if on the south side they put a window large enough to accommodate the pails?

PROF. BERGEY: The only protection that I would advise to take is to protect them against dust.

A Member: In the milkhouses with the window in front. It is the custom in many places to hang the pails on the fence. They get dust as well as the ants.

The CHAIRMAN: I still believe that you do not understand the conditions in our community in reference to our milk trade here. The milk will retail anywhere from six cents a quart. There is some milk selling at retail at ten cents a quart. The conditions on the average farm here where they wish to cool their milk their water temperature is generally 50 degrees to 56 degrees in summer, their well or spring water. Now to get a temperature less than that to cool their milk they would have to install some ice. The question is, is the consumer ready to pay the additional cost? That is what we get up against. I know plenty of milk is sold in this town, where they are fairly careful with it, and it sells at wholesale at three cents a quart. You cannot produce it at that.

PROF. BERGEY: The matter of educating the public to that point, of course, that is a very difficult one. If it were possible to take them into the laboratory and demonstrate to them the difference between milk collected properly and cooled and kept cooled and the milk that is not so collected and cooled I think that you would very easily educate them to the point that they would be willing and anxious to pay the greater price for the satisfactory milk. That is just what our milk exhibit in Philadelphia is trying to do to-day.

The CHAIRMAN: Isn't it a very good thing to educate along with the producer the consumer as to how to take care of it after he gets it?

PROF. BERGEY: Yes, of course. If you allow your milk to stand at room temperature in the house it will not keep very long. You simply give an opportunity for the bacteria present to multiply and change, while if the same milk were kept at low temperature it would keep as long as is would be required to keep it.

A Member: Is there such a thing as healthy and unhealthy bacteria? What is the source?

PROF. BERGEY: We speak of the lactic acid bacteria as bacteria that are found normally in milk. You find them practically in all milk. I am not quite clear about the inquiry.

A Member: Lactic acid bacteria?

PROF. BERGEY: Unless you mean those we find in human and animal excrement, any number of bacteria, that always ferment the sugar of milk, thus producing lactic acid. They sour milk also but they produce their products which change the character of the milk, make it bitter or change its taste so that it is no longer fit for food; while the ordinary lactic acid bacteria simply change, sour the albuminous substances of the milk with the fats and make them distasteful.

A Member: What do you understand by milk increment?

PROF. BERGEY: I am not familiar with the term.

A Member: When ought it to come down to 50 degrees or 60 degrees?

PROF. BERGEY: As soon as possible.

A Member: One hour after drawn from the cow, how often would the bacteria multiply?

PROF. BERGEY: Bacteria under very favorable conditions would multiply in one hour. Under very favorable conditions of temperature they might multiply as much as three times. It should be reduced to 50 degrees within half hour after drawn.

A Member: How soon would you bring the milk from the stable to the cooler?

PROF. BERGEY: As soon as possible the milk ought to be removed from the stable and set to cool. Aeration in itself is not what is needed, simply cooling. The idea that milk has to be aired is rather a faulty one. The odor that we object to in milk is the odor derived from foreign material, from dirt, and not from anything that is inherent in the milk as such, unless the cow has been fed on something that gives it a particular odor; so that I think of milk simply as being cooled to have the animal temperature removed.

A Member: After taking all these precautions you have mentioned, is it not possible, after we take all that care, after shipping the milk that bacteria can enter the milk that is harmful to health, after it leaves our hands?

PROF. BERGEY: Assuredly.

A Member: In the report of the committee appointed by the Mayor of Philadelphia it was stated that so many people are retailing milk in cities under very unfavorable conditions, some of the places where you cannot sell healthy food let alone milk, and in many cases in houses not fit to live in. How are we going to get away from that?

It does not seem to be any use to produce good milk at this end if the care is not taken at the other end? How are we who supply milk cooling stations which has become the only way to ship milk to Philadelphia, how are we to overcome those things? How are we going to get any more for our milk if we do follow all these precautions that you mention? There is only one price there. We meet a certain standard of butter fat and for that we get a certain price, and since we pay for refrigerator cars we are getting a lower price than we have for some years.

PROF. BERGEY: Just how to overcome that I would be unable to say.

A Member: That is what I mean we are up against.

PROF. BERGEY: Not all handlers of milk seem to understand how milk should be treated and handled and all that the farmer may do is defeated in what the handler undoes.

A Member: Professor, is there a law or only a recommendation of the Board of Health, has a law been passed, an act of the Legislature or an ordinance, that makes us send milk under a certain temperature?

PROF. BERGEY: That is a law; I think it is enacted.

DR. CONARD: If the cow's temperature is up to 100 degrees or a little above it, it is not uncommon to find a stable's temperature 90 degrees this kind of weather, and the cows are in there. If the milk is left to stand there at that temperature for an hour, between 90 degrees and 100 degrees, how rapidly will the bacteria multiply? More so than at 70 degrees?

PROF. BERGEY: Very much more so.

DR. CONARD: Do you have an idea how much more so?

PROF. BERGEY: They might multiply two or three times as rapidly at 90 degrees. It depends on the organisms. Some multiply far more rapidly than others. Some would not multiply at that temperature. The temperature would prohibit some from growing.

A Member: Is it not true that multiplying at a low temperature increases the more dangerous form of bacteria that high?

PROF. BERGEY: No. The lactic acid bacteria multiply at low temperature while at the high temperature the dangerous form increases.

A Member: Well, then how about the deadly germs that get in ice cream?

PROF. BERGEY: Of course, you get there the form of action which I had not in mind when I answered your question first. You get there the decomposition; it is the decomposed particles, the residues which they have left after they feed upon the ice cream itself.

A Member: Is it true that of all the bacteria in the milk the farmer produces under undesirable conditions, are they the bacteria, 90 per cent. comes from the cows and from the order of dung and gets into the pail at this time of year? Is that true that after all, from the dung, from the ceiling and from all these sources, and from the closets while not in condition they should be, isn't it down in the bottom from the cow not being properly cleaned off, does it not take in 90 per cent. of the dirt?

PROF. BERGEY: I should say the percentage is more nearly 98 per cent. or 99 per cent.

A Member: If that one thing was corrected could not farmers produce a good wholesome food.

PROF. BERGEY: That is just what I tried to bring out. It is these extraneous bacteria that have no business in the milk are the ones we can control very largely by these comparatively simple measures.

A Member: What is the best practice, to inspect the herd or the product?

PROF. BERGEY: I think both are useful. I think you cannot discard one in preference to the other.

A Member: In asking this question I do not want to throw any discredit upon anything said in your address because it has been held at some places that it was not only necessary to protect the cow but to produce a sanitary product of the cow as we are trying to do the best we can; but I do believe the public is educated to believe that there is more danger in bovine tuberculosis than really exists, and the question is this: Have you a personal knowledge of an authentic case where human consumption has been obtained from bovine tuberculosis?

PROF. BERGEY: No; I must say I have not because I have never worked on that question personally. All my knowledge is based on the statements of other men whose statements I am willing to accept as authentic. It is a question of immense importance and of great interest to me. I have been interested in bovine tuberculosis for many years, but from my own knowledge I cannot say that I have encountered this organism, but men competent to judge have found them and it is their statements that I am willing to accept.

A Member: They all do know of cases where people obtained consumption from contaminated farms and contaminated people, but we are not sure of this.

PROF. BERGEY: Tuberculosis is more easily communicated from one individual to another than in any other way. It is probably far more rare to find tuberculosis coming from tubercular cows, but we believe it is possible. For that reason we believe we are justified in regarding that milk as dangerous.

The CHAIRMAN: If there are no other questions on this subject, we will now proceed with the regular program. The last topic of the afternoon is, "Essentials of Butter Making," by Mrs. Jean Kane Foulke, of West Chester. I now have the pleasure of introducing to you Mrs. Foulke.

MRS. FOULKE: I don't think I am going to take up your time making an apology for being here. You can look at Mr. Martin and

his face will tell you why. He asked me to come here last December or early winter and he is responsible.

But I don't pose at all as an expert. I am not a trained person, except in the school of experience. I have had a little experience and if that experience will teach you anything about home butter making I think I will have also done a good turn.

Mrs. Foulke then delivered her address as follows:

ESSENTIALS OF BUTTER MAKING.

By MRS. JEAN KANE FOULKE, *West Chester, Pa.*

I feel as if I were undertaking a great deal in attempting to tell an audience of farmers how to make butter, because I am not what is termed an "expert" myself; that is to say, I am not a trained butter maker, never having taken a course in butter making in any agricultural school, or indeed in any school save that of experience. However, as you all know, experience is credited with being a good teacher, if a hard one, and it is possible, therefore, that mine may have taught me some lessons that may be of use to some of you.

To make good butter is not such a simple matter as it appears, and it demands a care and attention that is seldom given to it. This fact accounts for the amount of bad butter that you see sold and used, and is one reason why oleomargarine and other patent butter is in such demand. They not only are cheaper or as cheap, but they run more evenly good, keep better and taste better.

The first essential for good butter is to have good rich milk and clean milk, milk that is free from any extraneous flavor such as may be absorbed from the atmosphere, feeds or plain dirt. To get this care must be taken as to the kind of feed used, especially if the milk is for butter. Milk that tastes all right and *is* all right for other purposes, when used for butter will not do at all. One can often distinguish the different tastes of feeds in the butter, and any radical change in the feeding may be at once detected. A little too much silage will spoil butter, and in cases where several cows' milk or the produce of the whole dairy is used, a knowledge of what each cow is getting, the amount, etc., should be carefully watched and known, and the effect upon her milk noted. This should be done in every dairy, as a matter of fact, as it is only thus that the feeding can be profitably done. Many cows do not need, and others do not digest, the kind of food or the amount of it that their fellows in the same stable should have. It is this knowledge of the individual that is a most important feature in any sort of dairying, and it is essential in a butter herd as a cow's milk is affected by her condition and this quickly affects the butter.

Having made sure that there is no taste in the milk from the feed that will show in the butter, the next thing is to be sure that the milk is cleanly drawn—that the milker has clean, dry hands, that the cow's sides and udder have been brushed and freed from manure and dust, loose hairs, etc., and that the milk is taken as soon as possible from the stable to prevent the contamination from the unavoidable odors and dust of a cow barn or milking shed. Care should be taken that the cans and pans are not exposed to road dust and manure and that they are scalded and washed thoroughly clean.

The milk is now ready for the dairy, and it depends very much upon whether it is to be separated or hand-skimmed what is to be immediately done with it; but as I am speaking of profitable butter making I assume that it is to be separated. In my opinion, milk for butter making should never be thoroughly cold. It should be *cool*, but never thoroughly chilled. In the dairy of which I have charge the milk is separated at a temperature of about 75 to 80 degrees. It is necessary to hold it over night, as we separate but once a day, so that the evening's milk is set in coolers or cans in the spring. These coolers hold about 12 quarts, a convenient size to lift.

Our spring water keeps about 56 degrees. I have a coal stove in the spring or dairy proper and keep a low fire all winter, keeping the temperature about 60 degrees and we try not to have it vary more than a degree or two one way or the other, and are very careful about ventilation and to prevent coal gas, dust, etc. Men are not allowed to enter the dairy in their working shoes nor is smoking allowed there. Care must also be taken after white washing. This dairy is an old fashioned spring house and has been made over somewhat to suit modern methods and increased trade. Of course it would be better if it could be heated by pipes and thus do away with the stove, which in this case necessitates covering the cream each time it is raked and the ashes removed, and great care in seeing that there is no coal gas which would affect the cream at once.

The cream should be stirred down every day and thoroughly mixed. To do this I have a round disk of tin, with a row of inch holes, fastened on a steel rod about two and a half feet long, about like a poker. This disk or tin plate is just large enough to fit inside the coolers and be moved up and down, allowing the cream to come through the holes and thus becoming thoroughly mixed. Cream should not be allowed to fall far from the separator to the can, as the air in the froth on it seems to make it rancid very soon and stirring down into the can ruins the whole can of cream.

Ripe cream is *sweet* cream *soured*. Soured cream has a pleasant smell and is not rancid or strong. It tastes good and is pleasant to eat. I know of no better dessert than a saucer of soured cream and a slice of soft ginger bread, and can think of nothing worse than to have to eat a saucer of *sour* cream even if accompanied by "angels' food."

Sour cream is cream that is spoiling and on the way to putrefaction, but soured cream or what is called ripe cream is luscious and sweet. It has reached a point of fermentation where it is still fresh and unspoiled, and has not yet begun to decay. To bring cream to this state at the time desired is a delicate matter. In my own case I have the coolers lifted out of the spring and stood on the cement floor, and into

each one I put a little more than one-half pint of squiring from twenty-four to thirty-six hours before churning. This in an atmosphere with a temperature of 60 degrees will ripen the cream sufficiently for butter making, although if the dairy temperature is lower it may take longer.

The souring is made fresh each butter day—we churn twice a week, each Monday and Thursday—by taking six quarts of separator skim milk and adding two quarts of fresh butter milk, which is well mixed and kept stirring each day, the top being taken off before being used for souring.

The public demands butter of a good rich color, but except in Summer, and not always then, do even Jerseys given cream that will make yellow butter. Therefore the butter maker must resort to some of the many kinds of butter coloring that are on the market and are sold under the pure food laws. I have used “anato,” which is a South American gum or root which comes in a powder very finely ground, a purely vegetable compound and entirely harmless. I know of but one place where it may be had and that is at Hansell’s, No. 8 S. 18th Street, Philadelphia. I used to buy it by the pound but now it must be bought in five pound packages. It should be kept in a dry place. Preserve jars make good tight receptacles for it, and by opening one jar at a time the balance may be kept safely. I use at this season of the year and through the Winter one tablespoonful to seven coolers of cream, mixing it first in about 1 quart of luke-warm water, and then stir it in the cream with the mixer described before.

The cream is now ready for the churn and to get the churn ready for the cream is the next step. I want to say here that scalding water, and plenty of it is a necessity to successful dairy work, and if one can have steam also it facilitates the work of cleaning and sweetening the dairy utensils, churn, separator, etc., enormously. The churn should be thoroughly scalded and rinsed, then chilled with plenty of fresh, cold water, after which it is ready for the cream, and we may begin churning. In this cleaning work use no soda and no soap except possibly to wash the rubber rings of the separator.

It should require about half an hour for the butter to come and as soon as you have butter the size of shad roe or very small marbles it is time to stop churning. After that to continue churning merely injures the texture of the butter. You get no more out of the cream but merely gather it into large greasy lumps.

Draw off the butter milk through a wire sieve to catch the butter that will flow out with it. Then rinse the butter with cool, not cold, water and take it from the churn.

While the churning is being done, one should have scalded all the paddles, prints, etc., to be used, also the butter worker, and should have chilled them afterward and left them in cold water. We set ours in the spring to await our needs.

The butter is put on the worker and the salt is spread over it. We allow half an ounce to the pound, and it should be weighed, not guessed at, unless you have buckets to hold the butter and measures for the salt that have been tested, so that you know what you are doing.

A sponge with a bit of cheese cloth about it makes a very useful thing in working butter. One should stand sideways to the worker, with a sponge in one hand the paddle in the other, and keep turning the butter up and over to the worker, and keep constantly patting it

with the sponge, thus absorbing the water more quickly and lessening the danger of destroying the grain by over-working to get dry. The water and the salt should, however, be well worked out, not only the experience can tell one when this is sufficiently done; but there is a look that means a little to the experienced butter maker that the butter is worked.

In butter, as in everything else that we want to sell, appearance counts for much and care should be taken to have the prints sharp and well cut, so that the butter may take the impression clearly, after which it should be neatly wrapped in butter paper and set in pans to harden. In Summer the butter is often too soft, when first printed, to wrap and should be laid on open papers in the pans and wrapped later. The triangular point of paper at each end of the package should be turned under, rather than upwards, in wrapping as it makes a neater package. Some persons have naturally cool hands and these are fortunate if they must handle and wrap butter. For myself, I have a warm hand and so must be continually dipping my hands and arms to the elbow in cold water to keep my fingers cool and dexterous.

Too much care cannot be given to the cleaning up after butter making, for much of the success of the next butter depends upon the sweetness of the utensils used; and especially when they are wood is it necessary to scald and scrub and steam them, clean, chemically clean, so that no animal fat may enter the grain to decay and thus destroy the possibility of making good butter or keeping the dairy tools sweet. It is impossible to get them thoroughly clean if once the grain gets full of rancid fat and grease.

A dairy should be light and cool and well ventilated; not a dark, damp little cave as many of them are. It is impossible to make good butter without clean, sweet milk and cream, and clean, sweet surroundings; and it is this cleanliness and sweetness that makes the charm of the churn and that are the essentials of butter making.

The CHAIRMAN: The paper is open for discussion if any person wishes to ask questions.

DR. CONARD: About what percentage fat is that cream, heavy or light?

MRS. FOULKE: Very heavy.

DR. CONARD: I suppose 40 or 50?

MRS. FOULKE: Yes, sir. I made a few notes here that I thought would be interesting. I kept very careful account in connection with the dairy and I thought possibly they might interest some of you gentlemen as well as the ladies. In the dairy that I run we have milked 28 cows. They are grade Jerseys, most of them. We have a 13-horse-power boiler and 5 horse-power engine. That engine runs the separator and churn and butter worker and the pump that pumps the water to the mansion house. We have a 60 lb. Embree butter worker, cylindrical churn with perforated paddles.

Now I have been feeding to 28 head 35 lbs. of ensilage, 1 lb. cotton seed meal and 10 lbs. of grain, 5 lbs. of Sugarine Dairy Feed and Hol-

stein Grains; then about 8 lbs. of hay in the middle of the day. In January, 1911, we produced 711½ lbs. butter; in February 621½ lbs.; March, 862 lbs.; April, 895 lbs. Of course, that was taking the dairy, some dry some fresh and some just milking along. I struck an average for the year, from April 1st, 1910 to April 1st, 1911. I could not give the amount exactly of hay or straw used, neither could I give the account exactly of the cost of raising the corn for ensilage, but I did count the time taken to cut the corn and filling the silo and I took the wages of the two highest priced men on the place who have to do with the dairy and all the cost of bought feeds; also I counted the by-products of the place which I regard as very valuable in connection with the dairy. I bought some and sold some; and added on that, and I find that in the year from April 1st to April 1st we had made a net profit with those things taken out of \$2,115-13.

A Member: When do you feed?

MRS. FOULKE: I have had the feed put in when the cows are put in.

A Member: Before milking?

MRS. FOULKE: The feed was put out for the cows, of course in the winter when the cows are in the dairy. Now they are turned out and the feed is put in the trough for them and they come in at supper. They get the ensilage after they are milked, just afterwards. I put the grains in and they get the ensilage just afterwards.

A Member: How long do you leave the butter stand after you have it all printed?

MRS. FOULKE: I put it right away as soon as I can do it. Yesterday we made enough butter to have to work three different workings and went right to work as soon as we could. I have pieces of muslin cloth and we keep the butter in that after it comes off the worker and then we work it just as fast as we can.

A Member: Have you had any experience in working the butter in the churn?

MRS. FOULKE: No, we do not do that.

A Member: I understand your barrel churns roll?

MRS. FOULKE: Yes, roll around.

A Member: This is round?

MRS. FOULKE: Yes.

MR. BARNES: Did I understand you to say that you held the milk over from evening to morning?

MRS. FOULKE: Yes, we hold the milk over from evening to morning.

MR. BARNES: Do you find that more profitable than while the animal heat is in the whole of it?

MRS. FOULKE: I have been doing it because if you want to start up the machines, if you have a boiler it takes considerable fire.

MR. BARNES: In our case we use a gasoline engine?

MRS. FOULKE: I don't know whether you are lucky or not.

MR. BARNES: We separate twice a day.

MR. RODGERS: At what temperature do you separate the milk?

MRS. FOULKE: 75 degrees.

MR. KERRICK: How about your ensilage material?

MRS. FOULKE: I leave it go until the leaves begin to turn and it is about time to mature and then it comes in with the rest of the farm work. That is, I think the more corn it has in it the better it is. The best ensilage I had I had made from millet. I had a little millet. We thought we would be short of hay and we planted millet; then the hay came on; and I cut it just as the seed was becoming round. We cut it the way you cut oats and we put it in the silo and we didn't empty the silo for three years and it was as good at the end of three years as when it went in.

A Member: Would your butter stand up better than creamery butter?

MRS. FOULKE: Better. I sell it in West Chester to a very careful community. They are most of them Friends and they know when they spend money, and several people have said to me that one pound of my butter would go as far as one and one-quarter pounds of creamery butter or other butter.

A Member: What price do you get?

MRS. FOULKE: I would not take less than fifty cents just at West Chester, and for some butter I get seventy-five cents.

MR. CLARK: There is an agitation all over the country—there is a law—I do not know whether it will pass this week—that you have got to sell full weight now.

MRS. FOULKE: I do that.

MR. CLARK: Suppose you put up a pound trade print, how long will it remain a pound brick?

MRS. FOULKE: My butter is so good that people eat it before it has time to shrink.

MR. CLARK: The Elgin people supply nearly all of the butter in the western end of the State and when it goes into the market to the consumer it weighs but a fraction over fourteen ounces, never very much more than a fraction over fourteen ounces. What is that fellow going to do?

MRS. FOULKE: I would try not to buy that butter.

MR. CLARK: They say they put up pounds. What is the reason for the loss?

MRS. FOULKE: I think they put it up all right but they put a lot of water up with it and water will evaporate. Butter well worked will stand up.

MR. CLARK: It will not lose that much?

MRS. FOULKE: It will not lose at all.

MR. CLARK: These fellows are in Harrisburg lobbying now?

MRS. FOULKE: Oh, well, I can't vote.

A Member: What percentage of moisture is there in butter after it is worked?

MRS. FOULKE: Not any at all. I work mine as dry as I can get it.

A Member: What is the average income on each cow? You say you had 28 cows?

MRS. FOULKE: I do not think I could tell you that. If I knew that you were going to ask me that question I could have answered.

A Member: How many acres of land do you have?

MRS. FOULKE: The two farms that I have charge of make about 150 acres; and I also rent a great deal of extra land from neighbors or else buy the crop. Last year I had between thirty and forty extra acres costing about \$76.00.

A Member: Do you pasture your cattle?

MRS. FOULKE: Last year I did.

A Member: Did you ever run over a year that you did not pasture?

MRS. FOULKE: No I never tried that.

MR. DEWITT: I wish to make a little statement. We have up in our country a condenser near Mansfield, Tioga county. A man coming from the vicinity of the condenser has ten cows; just cows not only fancy breed but good looking cows. I saw the cows. He patronizes that condenser. His cows brought him in \$96 a year without any of this extra trouble, apiece.

MRS. FOULKE: \$76.00 a year over and above the cost of food and labor would be the average for each of my cows.

A Member: You did not figure out all the feed.

MRS. FOULKE: Total profit of \$2,115 on 28 cows would be just about \$76.00 apiece profit after the labor and feed were paid for. The only thing I did not account for was the hay and the corn in the ensilage; but against that I left the heifers, I left the 15 heifers; and the manure certainly ought to cover the hay.

Deputy Secretary Martin then announced the program for the evening and granted five minutes to Mr. Charles W. Evans, representing John R. Livezey, 1933 Market Street, Philadelphia, Pa., dealer in cork floorboards, to explain the merits of his wares.

Mr. Evans addressed the Institute as follows:

MR. EVANS: I thank you and I thank the gentlemen who are here and have kindly extended me through you this courtesy.

I am here, ladies and gentlemen and Mr. Chairman, with an axe to grind as I have been at a few of the Farmers' Institutes held this Spring more closely to Philadelphia. That is to say, I attended nearly all of the Farmers' Institutes held within a radius of 50 to 80 miles of Philadelphia. I am advertising cork brick which is a comparatively new substance and has been successfully used in paving cow stables, pig sties and for horse stables also. This material was first made upwards of two and a half years ago in a little different form from what it is now, or in other words, somewhat softer than now. We have a material here which according to my argument is the only practical pavement for a dairy barn in that it possesses qualities which no other material possesses. If we have a concrete floor we have a degree of sanitation, but we have a hard and cold floor and we also have a floor which is slippery after it has been worn sometime or if it is put down and roughened upon the surface in order to prevent it becoming slippery, then we lose the sanitation, because we have the lodgement there of the manures of the stables. In cork brick we have a material also which absorbs less moisture than any other known practical paving material. It absorbs only one-half per cent. moisture. Concrete absorbs a large quantity; I do not know what proportion but I do not think I am wrong when I say it would absorb anywhere from twelve and one-half to fifteen per cent. moisture. That, of course, is the pavement used at the present time more extensively than any other in our improved dairy barns. There is but one drawback to the use of cork brick and that is its cost. It cost anywhere from three to four and one-half dollars a square yard to lay it, according to conditions and according to whether or not it is desired to put down the concrete foundation upon which it should be laid. Now I am laying these facts be-

fore you in order that you may think them over, that you may be in possession of facts which undoubtedly should be of interest to dairy-men and to stockmen. I know that this pavement is a successful one. I also know that it is costly. We cannot get away from that fact. It is so good that my argument is that it pays to pay out this extra money for it, particularly where we have a registered herd as on a dairy floor and in the stock business. I attended a sale not long ago where there were three head bought by one man for \$3,600. Of course, other cattle are sold higher than that. But what will be the result if a bull worth \$3,000 should fall down and break his leg. I know that is somewhat remote, but sometimes that will be brought home. We have here a pavement that is sanitary; that is never slippery, wet or dry; that is resilient; never becomes cold like tile or concrete. We are told by veterinarians that cold pavements may start up bad diseases and where already contracted they may make them worse.

I have brought with me, contained in these packages that I have here some full sized samples of these cork brick which I am very desirous should be carried away by you gentlemen if you are at all interested in this subject. They are gratis. I also have reading material. I also, in addition to that, have some small samples which are at your service.

The CHAIRMAN: Is there any other business before the meeting? If not, the meeting now stands adjourned until 7.30 o'clock this evening.

Tuesday Evening, May 23, 1911, 7.30 o'clock.

Dr. M. E. Conard in the Chair:

The CHAIRMAN: The meeting will please come to order. The first subject on the program this evening is, "What is the Matter with Pennsylvania Farmers." That is what we all want to know and Mr. T. D. Harmon, of the National Stockman and Farmer, will tell us about it. I take pleasure in introducing Mr. Harmon to you.

MR. HARMON: Mr. Chairman, Ladies and Gentlemen: I wish I could tell you all "what is the matter with the Pennsylvania Farmers." I am going to read just what I have to say. I have written this out carefully. My stenographer wrote it for me and I think she said some things which may interest you. If it don't, tell me to stop and I will do it at any time. From what I learned since I came here, there is certainly something the matter with the Pennsylvania farmers. Mr. Martin asked me this Spring if I would not go on the program. He is a great joker and probably wanted to spring a joke on you. He told me I could select my own topic and I selected this and he acquiesced. I think it would take several volumes to tell "what is the matter with the Pennsylvania farmers" before I got through; not in the way of criticism, but I really found lots to think about and I wish I could convey to you all the thoughts that have gone through my head in the last three or four weeks on this topic. I believe you will all ad-

mit there is something the matter with the Pennsylvania farmer as well as the farmers of other states. I will simply stick to my manuscript. They asked if this screen and picture machine belonged to me and I said yes. Somebody said I had the pictures of every institute worker in Pennsylvania, and I also had the pictures of their farms and was going to show the people just what they looked like. I am sorry I have not got them as I believe it would be interesting to everybody here.

Mr. Harmon then presented his paper as follows:

WHAT'S THE MATTER WITH THE PENNSYLVANIA FARMER.

By T. D. HARMON, *National Stockman and Farmer, Pittsburg, Pa.*

It is an old and true saying that "Our friends tell us our faults; our enemies encourage them." It is upon this theory that a few thoughts along this line might not be amiss on this occasion. Without the remotest idea of fault-finding or criticising any one or any condition, "with malice toward none and charity toward all," it shall be the aim of the speaker to point out *some* of the shortcomings of *some* of the farmers of our grand old Commonwealth, and if possible offer some suggestions for overcoming the same.

No man is perfect. The trained mechanic, the learned professor, the teacher, the doctor, the business man—each make mistakes. Then why should we not expect to find errors in judgment among those who till the soil or tend the herds, and while looking for those things which might be made better among the farmers of Pennsylvania, it is only justice to say that in other states worse conditions prevail and criticisms could be applied more fittingly than in our own.

I honestly believe that the first and greatest fault to be found with the farmers of this or any other state could be placed under the head of *Laziness*. I anticipate a storm of protests from those who hear this, from those who have been putting in from fifteen to eighteen hours out of each twenty-four hours of the day during this busy season we are just now passing through, but I stick to the original proposition. It is said that God, as a climax to His creative genius, made Man; that he made him a little lower than the Angels; that He gave him reason and the power to think; that He then placed him in the Garden of Eden and gave him power and dominion over every other living creature. Later on in the Good Book we are told that He classified the peoples of the earth, making some of them kings and princes, overseers, hewers of wood and bearers of burdens. There is a significance in all this. If the allwise Creator has done all this—has recorded in His Divine Word an outline of His idea as to what man should do and man should be, then it is our duty to study His designs and purposes and follow them out as nearly as possible. If God gave you more brains and less muscle than the ox, then He intends that you

should use your brains more than the ox and your muscle less than the ox. Herein is where the word "lazy" applies to too many men—whether they are farmers or follow other vocations. I believe, however, that it will apply more often and more directly to those who till the soil than to any other class of people.

In making this broad assertion, the term lazy is to be applied to mental and not physical labor. In other words, to the use of the brain instead of the muscle. How many men do you know, and you can possibly include yourself in this, who would not cheerfully go out and plow all day or chop wood or do any other hard manual labor rather than sit down and study out some difficult problem in farm management; or on the needs of his soil, or his livestock, or even write a nice long love letter to his wife if she is away from home, or an urgent letter to his wife's mother, urging her to come and spend the winter with him.

It is mental laziness that is referred to not physical, and is as common among farmers as good healthy thirsts are in dry territory. It is great thoughts that make great men. Clear thinking puts in motion actions that bring big results. We take our hats off to the great thinkers of this country. Did you ever stop to consider that one man was just as much of a thinker as another? He can't help but be. God put brains into his head, wound them up and started them off—just like the watch-maker puts wheels and springs into the watch and starts it. He can't help but think. He'd die mentally if he didn't. The only surcease is when he is asleep—and even then some men dream things that are more rational than their thoughts when awake. The neglect, or delay, or abhorrence of getting right down to work on lines of thought that stand for something and mean something for mankind in general, and the thinker in particular, constitute a laziness that has meant failure in more cases than has ever been recorded against the sluggard or the tramp.

David was a shepherd boy. That would mean to-day that he was a farmer boy. He tended the flock and possibly did the chores and churned the butter and answered the telephone and cranked the automobile and oiled up the flying machine for Jesse, his father. Possibly he pumped the pianola and run the phonograph for his mother. These are some of the things that he would have to do to-day if he acted in the capacity of a farmer's boy. But David did one thing more. He kept his thinker going in the right direction and acted upon his thoughts. He heard the sweet songs of the birds while in the groves. It put an idea into his head and he worked it out. His mind ran something like this: If the birds are capable of making such sweet music, why can't I? The same hand that gave the birds their songs gave me brains, more brains than all the birds in the mountains round about. I am superior to all other living things because God made me so. It is a great responsibility but I accept it and will use my talents. David did some good, clear thinking. Result: the mastery of the harp—music that inspired the highest thoughts of those who heard it and enabled the player to write songs in later life that for beauty and grandeur of thought have never and never will be equalled.

But David did another thing that brought him into the limelight probably more than his playing the harp. He learned to throw straight to hit the mark. He may have learned this while chasing the

woodpeckers out of the cherry tree or pelting the cats in the backyard, but he learned the art and he did it well. A big lesson lies right here. It is the easiest thing in the world to throw a stone and the hardest thing in the world to throw it absolutely straight. Goliath used his muscle to carry his armor and sword, which would have crushed the stripling, but David used his brains not only to select his sling and his pebble, but to find the soft spot in the enemy's anatomy. If Goliath had been hit on his muscles the stone probably would have deflected like a projectile hitting the armor plate on one of our modern battle ships for he had exercised his muscles only and they were like steel. His soft spot was his head. He had neglected to exercise it and it could not withstand the attack of even a smooth pebble into hands of a mere youth. There are too many men in all vocations that are just like this big ugly giant, they go about boasting of the mighty things they can perform, the amount of work they can do in one day, the men they can whip, the tricks they can play on their neighbors in a horse trade, or their ability to get the other fellow to carry the heavy end of the log, while their brain, their intellect, their ability to think better thoughts and do better things has been dwarfed for lack of use because they have been too lazy mentally and morally to develop into that broad manhood, those higher ideals that the allwise Creator made possible for them to enjoy and which will be the answer to the prayer which we have all been taught at our mother's knee, "Thy Kingdom Come."

Pennsylvania was the pioneer agricultural district of the American Continent. Her soil, her climate, her industries, thrifty citizens and her geographical position made her the leader, giving to the new world and the new nation the best that the land would produce in grains, fruits and livestock. This preeminence was maintained without question until the sturdy sons and daughters of her prosperous people were allured toward the land of the setting sun, where homes could be secured for less money and prospects for prosperity seemed greater. This exodus of the children of Pennsylvania certainly did not rob her of her brains and honesty and integrity, but it must be admitted that with it went a liberal percentage of her enterprising and enthusiastic citizenship. The motive which lead men to venture into new territory imbued them with the idea of other new ventures and as a result we find the livestock interests of the Western states are far in advance of those in our own state, and I confidently believe that one of the greatest things that "is the matter with the Pennsylvania farmer" to-day is his neglect, rather his lack of interest in keeping up his herds and flocks. It is said that livestock and agriculture go hand in hand in making a country prosperous. In some sections of this State but little livestock is found that was reared on the local farm, hogs, sheep and poultry excepted. This is wrong. It is expensive. It is a bad system and should be corrected. Not long since I saw upon the farm of one man in a central county of this State as fine a farm team as could be found any where on earth. Upon inquiry I learned that the team had been purchased from a western shipper, who had distributed hundreds of good horses through that section. The team referred to, I learned cost the owner a sum of money that would require a thousand bushels of wheat or nearly two thousand bushels of corn to equal. This was robbing

Peter to pay Paul. The cost of that team represented the crops for two years of the farm on which it was working. This farm was saving at the spigot and wasting at the bung hole. Besides all this he was hauling away the fertility of his soil which could and would have been maintained by raising these horses instead of buying them. Livestock is the crying need of the greater part of our State and the full and lasting prosperity of our farmers will never be attained until the fact is realized that the fertility of our soil is the salvation of our country, and that fertility can be produced and kept up better and cheaper by marketing our grain crops on the hoof than in any other way. A prevalent fault or misfortune of most farmers is their inability to see the advantages of first class blood in all kinds of livestock and their unwillingness to pay a fair price for the kind of animals that will produce the kind that brings the best prices in the market. With a general awakening along these lines, Pennsylvania could step at once to the front as a livestock state, for she has the soil, the climate and the proximity to the best markets of the world. There is no question but what the valuation of the farms and farm products of the State be enhanced possibly many fold if the lowing of the kine, the bleating of the lambs, the contented grunt of the hog and the neighing of the young colts was heard on every homestead of our great commonwealth.

Lack of knowledge as to how to co-operate is one great misfortune of our farmers. Individually by inheritance, by training and by practice, they are slow to understand the benefits of concerted thought and action. Community interests bring to our people some of the very best things in modern life. Citizens of villages, towns and cities have learned that the welfare of their many interests are better conserved by planning and working together. Business men find that by mutual understandings and combinations of efforts many things can be brought about that would be impossible in any other way. The independent thinking of farmers and the pride in their personal opinion makes it a hard matter for them to get together and work together for their mutual benefit. The commercial interests of agriculture has suffered more than this lack of co-operation, possibly, than from any other cause. A close study of the markets, conditions of prospective crops, supply and demand and many other features of the commercial side of farming, farm topics that can be discussed to advantage and ideas formulated after considering the views of the many instead of the individual, and they are always more nearly correct than those based upon the opinions of the individual. Co-operation in every phase of country life and country conditions will be highly profitable from a social and commercial standpoint.

Conservatism is the stumbling block of more farmers to-day than possibly anything else. Slow to believe, slow to take hold and slow to take advantage of things that are to their interest they let slip by opportunities that would benefit for all time to come. Within the past ten or fifteen years science has done more for the farmer in a practical way than had been done in centuries before. Scientists learned that if their work was to be appreciated it had to be practical. Commercialism had set a price on things that were useful. Everything else went into the discard. Scientists caught on. They always do

when their bread and butter is at stake. They began to develop things that men who did not have such useless appendages as A. B., D. D., L. L. D., and D. M. P. H. L. after their names could understand and put into practice. It began to work. It was what the common herd wanted. It helped the farmer get hold of more dollars. In turn the "learned men" got more dollars and they worked on and harder and made their work more and more practical. To-day scientists are leading the farmers out of the wilderness by a shorter route than Moses lead the children of Israel. But Moses had his doubters. Many of those old Jews were "from Missouri". No doubt they told him so. It is so today. Human nature has changed but little since Eve ate the apple. "Show me" is the slogan that too many have adopted. "I'll try," should be substituted, and if one thing stands in the way of progress in agriculture more than in another it is the habit of doubting the progress that science is making along the lines of better farming. The only difference between a rut and a grave is its length. You might as well be in one as the other. I do not say that all this applies to all farmers, but it unquestionably does apply to too many, and it is undoubtedly the duty of those who have safely landed on the banks of the ruts to help their unfortunate brothers out.

Too much pride in the ownership of land is another common fault. Large landed estates is the bane of any community. It seldom adds to the happiness or wealth of the owner. Take a concrete example. Suppose that a man owns 100 acres of land. He has accumulated in cash \$10,000. Another 100 acre farm adjoining can be bought for \$100 per acre. Would it not be much better for him to use his surplus cash in improving his own farm rather than spending it to doubling his acreage. Think what \$100 per acre would do if used under scientific methods in the improvement of the soil. Think what \$10,000 would do in the way of stocking a farm with all kinds of pure bred livestock; what profits would accrue from the increase of the flocks and herds and how a man would be improved himself morally, mentally and every other way by associating with the higher types of animal nature. It is, indeed, more elevating often to be associated with a high grade hog than a low grade man. Think what \$10,000 would do in the way of installing conveniences on a farm. No dwellers in cities could boast of such healthful surroundings. The drudgery of farm life could be eradicated. Health and happiness could be enhanced and life prolonged. The proud possessor of 100 acres of land under these conditions could add to his own happiness, to the happiness of his family and be a blessing to the community in which he lived. It is things like this rather than acreage that measure success and places the man in the front rank among his fellow men.

Another weak spot among farmers is their lack of appreciation of leadership. Our armies have their generals, our navies their admirals, our governments their rulers and our political parties their "bosses." Much as it is to be regretted that that word "boss" has to be applied so often, it is nevertheless that no organization or party could be maintained long without some one to control it and direct its policies. There is a difference between a boss and a leader and there is but little danger of the former lasting long at the head of any organiza-

tion or forward movement among the agricultural classes. Some men are endowed by nature to be leaders. Others fit better in the ranks. When thrown together for the betterment of a common cause they find their respective places as naturally as water finds its level. Petty jealousies, misunderstandings, etc., are the sins of some communities. They retard progress and prevent the accomplishment of much general good. Farmers should rally their most capable leaders in every community and support them in his every effort to bring about better conditions, more prosperity, less friction and a square deal for the producer.

Modesty, or rather, false modesty might come in for just criticism among the farmers of Pennsylvania. There are men in this State doing things so much out of the ordinary that if the things were done in some of our Western states the public press would be crowded exploiting their great deeds. Boasting is abominable, but we are commanded in the Good Book not to hide our light under a bushel.

Many and various other weak spots might be dwelt upon under the title of this talk. It is not with a view to holding up to ridicule the weakness of our fellowman that reference is made to any of them. We are all mortal. It is said, "A wise man will change his mind; a fool never does." Upon this theory it is our duty to find out our faults and correct them. The world depends upon the farmer to be fed. Financiers look forward to your bounteous harvests to know how to figure on all their large financial transactions. Our nation is depending upon you farmers to furnish it with its presidents, its statesmen and its leaders. The most of our rugged, honest, fearless men in all the higher callings of life came from the farm. As the states make the nation so do farmers make the state. It is not our cities that furnish the brains to plan and the bone to build. It is the farmer's son who steers his course whether in commerce, statesmanship or the pulpit—straight as his father guided the plow. The simple, fearless faith of our forefathers is waning. The rush of business, the strain of commerce, the love for notoriety in statesmanship do not encourage it. If perpetuated at all it must be perpetuated on the farms of this country. You, as farmers, are entitled to all the honor that such a condition imposes. But with it rests a responsibility. Meet it like men and if then there is anything the matter with the Pennsylvania farmer that is not in accord with the most critical mind it will all be forgiven.

The CHAIRMAN: The next subject is "The Country Life Situation," by Dr. L. H. Bailey, Director of the Experiment Station of Cornell University, Ithaca, N. Y. It gives me pleasure to introduce Dr. Bailey to you.

Dr. Bailey then addressed the Institute as follows:

"THE COUNTRY LIFE SITUATION." (Abstract).

By I. H. BAILEY, *Cornell University, Ithaca, N. Y.*

Mr. Chairman, Ladies and Gentlemen, I come to Pennsylvania at this time with a great deal of satisfaction. For the past two or three years I have had a grudge against the State, because you took Dr. Hunt from us. I am coming to you to-night to speak and to get even with you.

I shall speak a few words about the "country life situation," as I see it. Two movements are now much in evidence touching country life. One is the "country life movement" itself, and the other is the "back to the land" agitation. These two movements are not at all synonymous; in fact, to a large extent they are antagonistic the one to the other. The country life movement is the effort to effectualize country life for those who are a part of it, to better the agriculture, to improve the schools, churches, roads and whole economical situation and the social condition. And as the effort to improve any society is fundamentally sound, so the effort to make country life more effective is socially and economically a sound movement. It is not necessary for us to assume that country life of itself is less developed or more developed than city life, but only to bear in mind that country life is not as effective as it is capable of being.

The "back to the land" movement is very largely a city impulse; in part a desire of cities to relieve themselves from congestion; in part a desire or effort to find work for the unemployed or to find possibilities for the "ne'er-do-wells;" and to a considerable extent the effort of real estate dealers to sell land.

Of course, we need good farmers and it does not matter whether these men are country-bred or city-bred if only they are qualified by experience, by type of mind and by other qualifications, to be farmers. But a large part of the city-to-the-country movement is socially and economically unsound as a solution of rural ills. A great many persons, undoubtedly, who are now going from cities to country will be very much disappointed. This will not be because farming is a poor business, but merely because many of those persons who go, will not be qualified to be farmers. Ordinarily it is unsafe for any man to change greatly the character of his life or activity after he is thirty-five or forty years of age. There are some inexperienced city persons who go to the country past that age who makes a success; but I am convinced, as compared with the whole number, that they are few. I am interested not in the "city to country" movement, because I am not a student of city affairs. I feel that other means must be invoked to solve the city matters than merely to send the surplus to the country districts. I am interested primarily in the re-direction of country life.

The theme that I wish to develop in your mind to-night is this: it is very necessary that at least a part of our civilization have contact with real experiences, real situations, with elementary conditions. The tendency of the time is the splitting and the complexing of our civilization and the develop-

ing along partial lines. There is a lack of wholeness in our lives. This is illustrated in our common manufacturing. For example, we no longer use the whole wheat for bread. We refine it out, first taking one thing and another out of it with the idea that apparently the value of bread lies in its whiteness and not in its completeness. It lies largely in its looks and baking quality. It is very necessary that a good part of our civilization have direct contact with Mother Earth and with types of experiences that bring many native qualities into play.

The farmer's business has relations with a large line of effort, which altogether makes up his type of life and his philosophy; whereas a man working in a shop does largely the same thing day after day and his philosophy of life may not be connected intimately with the character of the work that he follows for a livelihood. In the farmer's business, the philosophy of life grows out of the situation in which he naturally finds himself. The farmer is a real part of his background. He is as much a part of his farm as the trees, or the livestock or anything else on his place. It has often been said that farmers ought to live in towns, as the European farmer does. My conception is quite the reverse. There is the greatest necessity that a good man live actually on the farm. You cannot look after a farm when staying in the town; and the better the man the better also ought to be the farming. The greater complexity of the farming business, the greater is the necessity, of a good man being constantly with the business. The farmer has a different relation to his business from that of any other man. The merchant or manufacturer may plan his business from a distance and may not live in his store or his shop. The farmer is in his business day and night and is a part of the weather, and the crops and the soil.

I sometimes wonder what the farmer is going to do with all the advice he is now receiving. I wonder if he is going to be confused with the multiplicity of leaders, whether he is going to assimilate all the new work and make use of it. But with all the advice and talk and exhortation, the farmers have never yet been in a stampede or riot. That is not so true of city conditions. It is because they themselves are so closely in touch with the fundamental situation that they do not lose their heads. The new ideas are to be worked out, if at all, by persons who are a part of the situation. I would not capture a man and put him into a community for the purpose of working out any idea I may have. I would prefer to drop the ideas into the midst of the farming people and let them discuss them, and work them out in detail and slowly and fundamentally. There will be the teacher and preacher, the good farmer and forward man and woman here and there who will take up the work and try to work it out. If the new notions are allowed to be freely discussed by the farmers themselves, all those which are impracticable and chimerical will not persist, and those that are useful will in time bear fruit. We may count on the wild notions to fall on stony ground.

Again, in regards to fairs. I do not know how it is in Pennsylvania, but I am convinced that in general no money is given for agricultural purposes which produces such small results as that given to the fairs. Now, the difficulty with fairs is that they have grown away from their natural purposes and reasons. They are gaudy with gimcracks and geegaws and all kinds of extraneous and meaningless things. I know

many fairs that are serving their communities admirably, but, I am speaking in the large. I would not eliminate the county or local fair, not by any means. A man came into my office last winter and said, "our town fair is dead;" I said, "good." But he also said "we want to reorganize our town fair;" and I said "good" again. I suggested that he ask twenty of the best farmers whether they would come together for a plowing match with their best turnouts, their best men, harness and plows, and exhibit the most skillful practice in plowing. Why not make this the centre of a town fair rather than horse jockeying, and gather the other things around it, with good entertainments and good games, and bring into it all the good speaking you can about the good art of plowing; and around this centre build up exhibitions and exhibits of real value to the small locality. I think a local fair should exist only for educational purposes. I use "education" in the broadest sense. Of course, I would have recreation. I would have games and good entertainment, but I should try to have the enterprises develop out of the real affairs of that community as rapidly and as fast as possible. Too many of our fairs are colored by the events and the men who go from one fair to another, and which have no particular relation or connection with the development of the community that the particular fair represents. I am not opposed to horse-trotting as such, but if I had it I should want it to have some relation to the development of the horse types and welfare of the community or the State.

Now about the schools. It is most interesting that the schools do not represent the localities in which they exist. Our schools are yet male. The schools are attended by girls, but the studies are the old boys' studies. The centre of our civilization is the home, and no school in any community can rise to its possibilities until the home and family are the centre of its effort. The object of education is to teach persons how to live, if that is the proper definition, then the schools of the community must have direct relation to the welfare of the community. It must have relation to good cooking, to good housekeeping of all kinds, to sanitation, as well as to farms and business. A person said to me a few days ago: "Do you think a person can be an educated man or woman unless he has had Latin?" The person first took the precaution to ask whether I had Latin, and I had confessed I had. I wished then I had not had it, to have seen what the line of argument would have been. If the definition of an educated man is one who has had Latin, then it is easy enough to determine whether a man is educated,—we may ask him. I would not eliminate Latin or Greek. I would have a great deal more of it. My point is that no one subject is the exclusive means of education. Persons may be taught to think just effectively by study of farm-management as by the study of mathematics or Latin, if it is equally well taught. It has not been so well taught in the past, we must admit. The older subjects are better organized and solidified; but I contend that in themselves they have no greater or unique educational power. I had in my office for a long time a placard on which was a remark dropped by Dean Hunt: "Teaching, not telling." This is the core of education. It is not merely filling up on facts. I would not have our common schools merely inform the children about farming. That would not be education. But I would develop a system whereby the schools could teach the common activities of life for the purpose of training a person how to live, and to procure the mental training and application of it at the same time.

I should not eliminate the prevailing subjects from the schools. Progress must come by a gradual process of evolution. The schools are teaching in an elementary way the things that colleges and universities have taught, I mean to patch the new ideas on and on, until finally the patch will be the larger part of the garment. If we were to begin the schools all over again, of course, we should begin with the locality and the affairs of it and let the children grow out to the other affairs as they develop. The school should represent its place and its station, and then the exterior subjects should come as fast as the child has the ability and the school has the reach. I would not eliminate mathematics. They come as part of the process. The study of arithmetic is not an end in itself. It is merely a means of working out some of the conceptions of life.

But I wish to say something about religion. It is on my mind because the demands from churches and religious bodies, young men's Christian associations and other organizations is now very great. They are beginning to feel the call to more than they have done for the country life situation. I assume in the beginning that the mission of the church is to preach the gospel. What I have to say therefore is aside from that question. It is sometimes said that the school is going to be the center of rural communities. I doubt it. I believe that some institution of religion is going to be one of the social centers in the end. That you may get my thought, let me say that whatever our theory or philosophy of life may be, everyone of us begins where Genesis begins, "in the beginning, God." Well then, if the earth is God's handiwork, it is holy; and if the earth is holy then all the things that grow out of it they also are holy; and if the materials are holy, then all the good, honest, constructive effort put into the development of materials is holy. Now, no farmer in the last analysis, owns his land, not even in Lancaster county, Pennsylvania. A man does not take it with him into the next world. Society, that is, government, allows a man as the agent of society to hold a piece of land, and for two things: that he may make a living from it, and that he may help the rest of us to live. He produces more wheat than he wants, and the loaves of bread are for the rest of mankind. The remainder of us cannot live on the earth unless the farmer produces more than he wants.

Farming is a quasi-public business, and will be so recognized in time to come. The earth is holy, and it belongs to all the people. The farmer is the agent of society, or the people, to use land for the good of us all, as well as for the good of himself. No man has a right to skin the surface of the earth. Good farming is at the foundation a religious business. No, it may not have been necessary in times past, when society has been unadjusted, for persons to skin the land in order to be able to live. If so, society has been at fault. That will not be so true in the future. Every man who tills land owes a responsibility to society and to God for the use that he makes of it. Now, farming is at the bottom of our whole economics and social structure, because it provides the materials of subsistence. It is more important that the farmer has a religious reaction than that any other man whatever have such a reaction. Now, every person is fundamentally religious. The religious impulse must be developed or educated. It is the function of some organization to develop it. It is at present the

function of the organization called the church. Here I come to the rural church. The contact of the rural church with the agricultural situation, if it is to meet its responsibilities, is absolutely fundamental and it cannot be evaded.

Now I hope that I have put into your minds a conception of the elementary character and position of the man who stands on the land. I am not complimenting the farmers. They do not need compliments. The time was when people complimented farmers. The time has come when public men criticize farmers just as they criticize anybody else, and the farmer does not resent it. What we need to do is to tell the truth and let the situation work itself out.

THE CHAIRMAN: The next on the program is an address by Dr. Thomas F. Hunt, Dean of the Experiment Station, State College, Pa., on "Observations on German Agriculture," illustrated with lantern slides. I now have the pleasure of introducing Dr. Hunt to you.

DR. HUNT: Chairman, Ladies and Gentlemen: Just before I got up to make this talk Mr. Harmon said: "I can give you a pointer. After that address that was given by Prof. Bailey you better keep still." I think he is quite right, for as a matter of fact I am like the man who got up in response to a toast. He said: "Now I prepared that toast. I spent a great deal of time on it and I prepared it with great secrecy. Only God and myself knew what was in the remarks I was going to make. Now only God knows." I was carried away with the address we have all listened to and we have all enjoyed so much that I hardly know what I am to say.

Dr. Hunt then delivered his address as follows:

OBSERVATIONS ON GERMAN AGRICULTURE.

By DR. THOMAS F. HUNT, *State College, Pa.*

Returning from a vacation of eight months on the continent of Europe, I had made up my mind that I would not undertake to discuss European agriculture at least until the subject had had time to assume its proper perspective. Eight months is too short a time to understand the genius of any foreign country, let alone six foreign countries which we visited. Upon reaching my desk, however, I found that Mr. Martin, Director of Institutes, had been promised that I would give an address at this meeting, and that he had especially asked that I give some account of European agriculture. This evening I shall confine myself wholly to observations on German and Swiss agriculture. These are just such observations as any one might make traveling by train through any country. They are merely car-window observations.

The first thing that will impress an American traveler through Germany is the lack of country life as we understand it. The farmers of Germany live largely in farm villages. (See Fig. 1). The farm village of Grenchhof, near Heidelberg, is but one of the thousands of

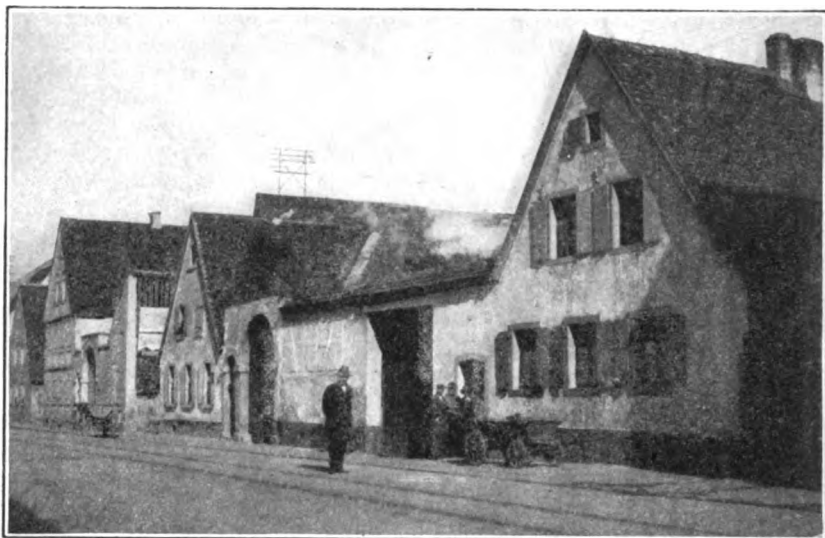


Fig. 1. A street in the German farm village of Edingen, near Heidelberg. Inside the door, where the men are standing, spelt is being threshed by steam power. There were about ten men engaged and it is estimated that they were threshing from five to ten bushels per hour.

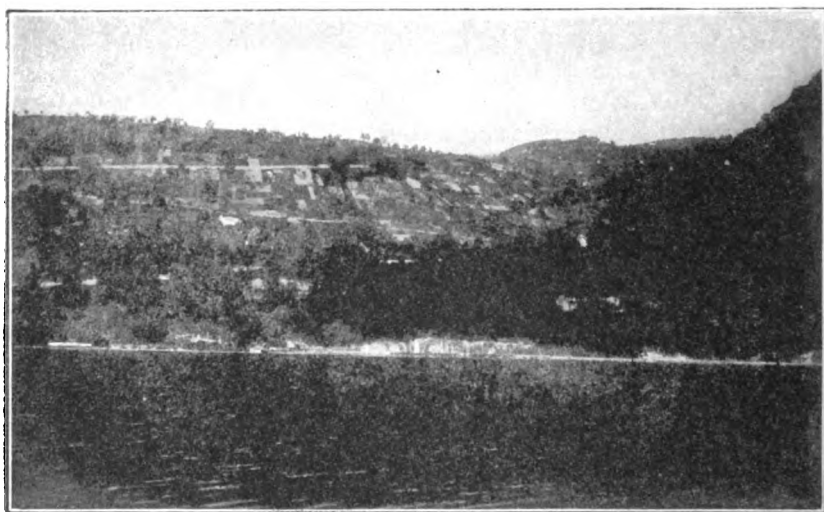


Fig. 2. Cultivated slope at Guten, Lake Thun, showing ribbon-like appearance of the country.

such villages. This little village consists of about two dozen homes built in a solid rectangle facing a little park or inner court. The houses all face this court and the entrance is at one corner, so constructed that when this entrance is closed there is no possible entrance to the village or to the houses. About half a mile away there was a well-kept cemetery, showing that the people who lived in the village were well-to-do people. This little farm village reminds one of an oasis in a desert, except that it was in the center of a fertile and intensely cultivated plain. On another day I walked from Norsingen to Wengen, two miles; from Wengen to Shalstat, three miles; and from Shalstat to St. Georgian, three miles. Between these villages there was neither house nor fence, but hundreds of people earned their living from the fertile soil. Doubtless, there is more than one reason for the farm villages and for the lack of country life, but everywhere one goes in Europe, whether in the villages, towns or the great cities, he is impressed with the fact that a man's house is his castle. As Mr. John Burroughs says: "Paradoxical as it may seem, the city is older than the country. Truly man made the city. After he became sufficiently civilized, not afraid of solitude, and knew on what terms to live with Nature, God permitted him to live in the country. The necessity of defense and fear of enemies built the first city; built Rome, Athens, Carthage and Paris. The weaker the law, the stronger the city. After Cain slew Abel he went out and built a city, and murder or fear of murder; robbery or fear of robbery have built most of the cities since."

Even in the larger towns to-day a stranger rings the bell at the gate. The latter is usually locked at night. Is the present day custom the result of tradition, social exclusiveness, or fear? As recently as 1870 blood ran in the streets of many of the towns and villages of France and Germany, and the inhabitants suffered the evils which always follow war. At present Europe is an armed camp. One can not escape the feeling that the people believe that they are safer to-day behind solid brick or stone walls and iron gates. However, not all the sections practice the village system. In some places scattered farmhouses are to be found. They are more common in Switzerland than in Germany. That Switzerland has a Republican form of government is perhaps not without its significance in this connection.

One of the great surprises to me in visiting Europe was the relatively large amount of level open country. Perhaps you have not made this mistake, but I had supposed that Europe was a rough and often mountainous country on which it was not possible to use to advantage modern agricultural machinery such as we employ so exclusively in America. The reason for this impression grows out of the fact that it is almost impossible to take a satisfactory picture of a level stretch of the country, and out of the further fact that travelers generally are not interested in the level tracts but hurry through them to what they consider the more beautiful mountain scenery. It is comparatively easy to take pictures of the mountains, and thus Americans see many illustrations of mountain scenery but scarcely none of the level areas.

The next thing which will impress the observer from the car-window is the ribbon-like appearance of the country, due to the fact that the land is divided into small rectangular plots. If one looks out over

these intensely cultivated areas it looks just as though the land were covered with large numbers of different colored ribbons. The picture shows a mountain side. (See Fig. 2). I was able to get the picture from the steamboat because the land was on a mountain side. When in the level sections, however, which are much more characteristic, it is almost impossible to get any photographs of the country which would give an idea of what the traveler sees.

Figure 3 shows the plots rather than the hop holes. The plot on which the hop holes stand is about 450 feet long and 30 feet wide. On the left is a strip of clover, and on the right a strip of volunteer grass, and next to this a strip of vetch. From the point where this picture was taken hundreds of acres could be seen which were laid off in plots with road-ways at the ends, and looked for all the world like a mammoth American Experiment Station. For miles in every direction the land was divided into similar areas. There were no fences, and, as previously explained, the people all live in farm villages.

In some parts of Germany, the sub-division of the land through inheritance, or otherwise, has gone on to such an extent that the Government has stepped in and by law re-distributed the land. As it is now, one man may own a dozen of these little tracts of land in various parts of the region in which he lives. The Government has in some cases re-distributed the land so that he should have all his land in one tract.

An incident occurred at the Agricultural Experiment Station at Bonn, Germany, which will illustrate the intensive character of some of the farming. I was shown some experiments in transplanting rye. It was explained that if rye is transplanted at just the right time, and planted a little deeper than it grew originally, the yield would be increased. The question on which they were experimenting was to find just what was the best time in the growth of the plant to transplant it. "Well," I said, "what of it? After you have made the discovery will it be of any practical importance?" The reply was, the smaller land owners could make use of it."

After looking over the beautiful, level, fertile areas, without a fence or a house for miles, every inch of which, except for the roadways, is under cultivation, I could not help wondering what an Iowa or a South Dakota farmer could do on that land if he would go in there with modern American machinery. There is no more difficulty in cultivating the land in 80-acre or 800-acre tracts than there is in South Dakota, except the separate ownership. Ownership is an artificial condition. It seemed to me that the natural conditions must prevail; the artificial conditions must give way. Later, however, I visited a farm of 300 acres conducted very much as an American farm is conducted. Here I found Polish women being used to pull the sugar beets. There is a law in Germany, as in this country, against contract labor; but they found it necessary, in order that crops on these large farms may be harvested, to allow the bringing in of Polish laborers during the harvest season. These people can only live in Germany six months, and then must be returned to Poland. I asked why they used women instead of men, and they said because it was cheaper. In other words, the Germans find it impossible to employ native labor cheaply enough to produce sugar in competition with other countries, or with the small land owners. After seeing this farm, I concluded that I would not try to reform the German Land System.

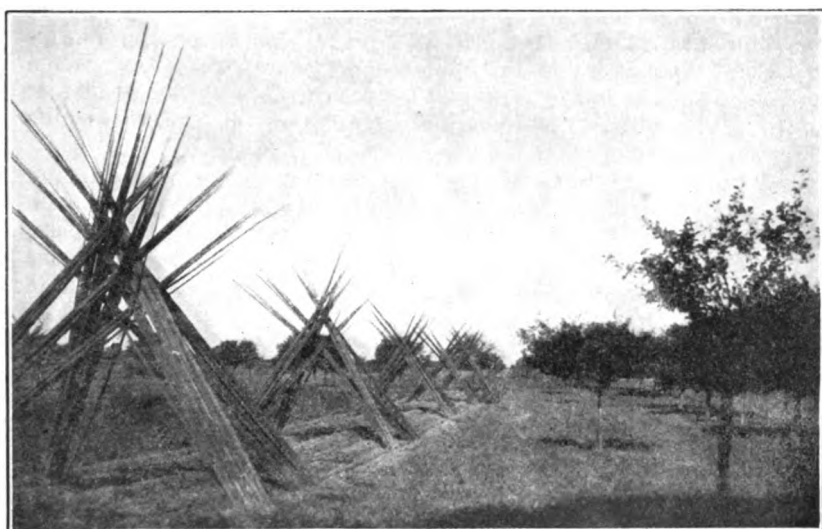


Fig. 3. Photograph showing method of dividing land into small rectangular areas.



Fig. 4. Horse and steer used together in Southern Germany. This roadway connects two small farm villages. It is not a high-way; it is a by-way.



Fig. 5. Tedding hay near Zurich, Switzerland, illustrating large amount of hand labor.

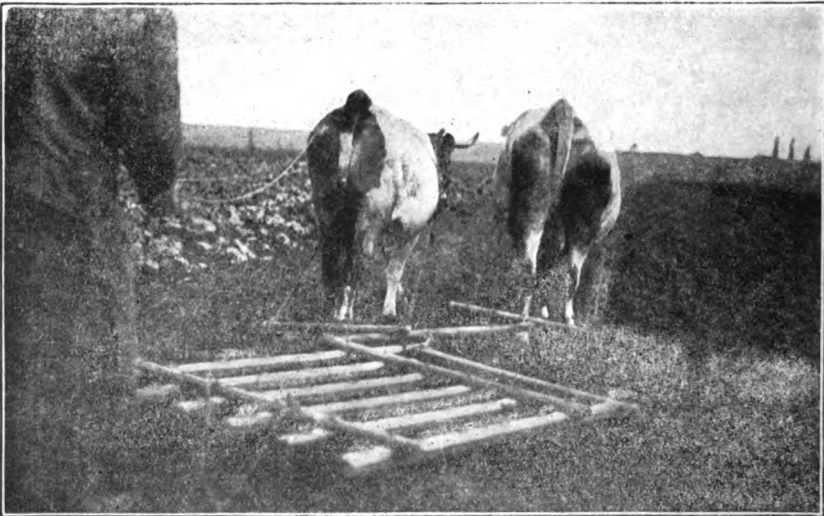


Fig. 6. Two cows hitched to typical harrow, Southern Germany.

Another thing which will impress the traveler in Europe, and the longer he stays and the more he gets in to the by-ways, the more he will be astonished and impressed. I refer to the good roads. Everywhere in Europe the high-ways are veritable boulevards, and the by-ways are similar to the road as shown in Fig. 4. In Europe they do not know what a thank-you-ma'am. If you investigate the matter you will also be surprised at the comparatively recent character of many of these road-ways. France, for example, has been inhabited more or less exclusively for eighteen or nineteen centuries. At the beginning of the nineteenth century France had 30,000 miles of road-way; the close of the century she had 300,000 miles of road-way, which would probably average as good as the one shown in this picture. During the same period of time, the raw agricultural products have increased in value from three billion francs to nine billion francs. No one, of course, would for a moment claim that the increased value of agricultural products in France was merely the result of good roads, but it is incontestable that the good roads of France are a factor in her increased well-being.

The next thing that will impress the hurried traveler is the general lack of improved farm machinery. I passed through Germany during the fall haying season. Everywhere men and women were working in the hay fields, (See Fig. 5) and in all Europe I saw just three mowing machines at work. I saw two horse hay-rakes, but only one of them was in use. Everywhere you see men mowing grass with a scythe, and women raking with a hand rake.

Necessarily a correlative to the lack of modern farm machinery is a large amount of hand labor. Women work in the fields quite as frequently as the men. I was shown into a barn in Southern Germany where five persons were running a steam threshing machine, and every person was a woman. The hurried traveler is very likely to conclude from what he sees that in Germany men wear uniforms and the women do the work, and I am afraid he is about half right. At any rate I have said, half seriously, that I believe Germany would starve to death if it were not for the severe toil of its women.

The employment of other animals than horses for traction purposes is another of the significant features of Europe. During a walk in Southern Germany, I estimated that of the animals used in farm work about one-third were horses, one-third steers, and one-third cows.

While Fig. 7 shows a very common form and size of cart in Germany, attention should be called to the fact that immense carts, drawn by single draft horses, are also not uncommon. In some cases a single horse is said to move, on two wheels, six tons. Instead of criticising or being amused at the use of dogs, (See Fig. 7) or cows, or donkeys or even man-power, we should learn a lesson from the experience of these older countries. The facts are, it seems to me, that in many ways the problem of transportation is better worked out in Europe than it is in our own country, and one of the factors is the adaptation of power to the economic need. It is not good economy to run a 50-horse power boiler and engine when only 5-horse power is needed. The dog, the donkey, the cow, and the steer finds a place in Europe along the side of the most modern up-to-date methods of transportation because each serves present economic needs.

If the traveler will descend from the train, and go out into the fields, he will be impressed with the tremendous fertility of the soil

in many places. I saw land in Europe that had been cultivated for twenty centuries that is as fertile as any land in America. The Rhein Valley, between Freiburg and Frankfurt, had been farmed for the last 1,200 years. It raises two crops which contribute largely to that fertility, viz.; Alfalfa and mangel-wurzel or stock beets. The alfalfa furnishes succulent and protein food for livestock and keeps up the nitrogen supply of the soil, while the mangel-wurzel takes the place of our Indian corn. As a matter of fact, mangel-wurzels are watered-concentrates, so that with alfalfa and these stock beets the farmer has two ideal crops, both from the standpoint of milk production and of keeping up the fertility of the soil.

In addition to this Germany has, as America well knows at moment, the potash supply of the world. Thus, the German farmer has a cheap supply of potash, and by means of its basic slag it has supplies of phosphoric acid in one of the best known forms.

In view of all that has been said of the lack of farm machinery in Germany, and what seems to an American the primitive methods of farming, one must not fail to call attention to the general prosperity of the German farmer. To the casual observer it is a puzzling fact, for not only are the people in German cities prosperous, but the German farmer appears prosperous. When one studies it seems almost impossible that it should be so. I talked with a young Canadian, who spent three years in Europe studying History and Political Economy, concerning these conditions. His explanation was as follows: "America exported agricultural products and imported manufactured products, therefore, our tariff system protected the industries rather than agriculture. That perhaps in America, with its fresh lands and farm machinery, they could carry this burden for the benefit of the industrial classes without feeling it." In Germany, however, he claimed the situation was just the reverse. Germany imports agricultural products, competing in the world's markets with its manufactured products. Now, he said, when a country competes with other nations of the world for a market, its protective tariff system is of no avail. On the other hand, he claimed, that science, as applied to industry, had reached the highest development of any country in the world, and the industries could afford to be taxed for the support of the farmers of Germany. In other words, he claimed, that the protective tariff in Germany made the farmer more prosperous; while in America it made the manufacturer more prosperous. This gentleman was a Canadian, and consequently looked at those things somewhat differently from those who live under a protective tariff. He did not state the problem fully. The German Scientist has calculated, it is said, just how many more people can be supported on the farms of Germany if the crops which are raised are fed to livestock, and the manure put back on the land, then if the crops were sold.

The German Emperor is in favor of keeping the largest possible population upon the farms, because it means for him a strong army and a strong navy. The German Government, therefore, maintains a fiscal system which promotes the keeping of domestic animals, and to offset the burden which the industries must carry, in connection with this fiscal system, applies the highest scientific intelligence to its industrial enterprises.



Fig. 7. Common hand cart drawn by boy and dog.

There is one further impression which has ripened up in my mind since I have visited Europe. I find that I have been giving too much emphasis to our natural resources. I have given too large a place to the advantage which we derive from the fact that we are a comparatively new country. No one will seek to deny that we have great natural resources, or deny that we should conserve these natural resources in every possible way; but, it seems to me, that the agricultural possibilities of France are to-day as great as any similar area in America of which I have any knowledge. A former Consul to Canada from Argentina once said to me; "I do not look upon the United States as a nation, I look upon it as a new civilization." I did not then understand what he meant, but I think now I have some notion of it. The fundamental reason for America's prosperity does not lie so much in its natural resources as in its civilization. I have, therefore, come to believe as I never believed before that this country-life-movement, of which Director Bailey has spoken to-night, is the most important problem which we have to face. We can not rest upon our natural resources; if our children are to inherit the earth, progress is necessary.

The CHAIRMAN: This closes the evening's program, and to-morrow morning we have a very extended program in which horticulture will be the chief subject. The meeting stands adjourned until 9.30 o'clock to-morrow morning.

Wednesday Morning, May 24, 1911, 9.30 o'clock.

Mr. J. W. Stewart in the Chair.

The CHAIRMAN: The Chair certainly desires that this session be one of the most profitable and interesting sessions of this series of meetings. If we have not yet reached the climax, we desire to move in that direction during this session. We have an important and interesting branch of agriculture to be discussed in your hearing this morning. We have no doubt that the gentlemen who will address you are full of enthusiasm, full of facts and full of entertainment for you, and it seems to me, surrounded as we are, that we are all in the frame of mind to make this an interesting and profitable session. If there is no other business at this period we will proceed with what you find upon the program.

DEPUTY SECRETARY MARTIN: With your permission, I would like to offer a remark. Gentlemen attending this convention who have not registered will please report at the intermission their names and be registered. Time is too limited to permit us to have a recall of the roll. Please bear that in mind as it is very important that we get the names and address of all the delegates and all visitors.

The CHAIRMAN: We have three discussions, ladies and gentlemen, upon this program and we will divide the time if satisfactory to all as nearly as possible between these three speakers. I have the pleasure of introducing to you Mr. Chester J. Tyson, Floradale, Pa., who will discuss the "Handling of the Apple Crop."

MR. TYSON: Mr. Chairman, Ladies and Gentlemen: After hearing the addresses last night I was brought somewhat to feel that what I have prepared to bring before you might apply more especially to a gathering of growers than to a gathering of teachers, but in thinking the matter over further I believe that if what I have to say is worth anything to growers and handlers of fruit, it may also be of value to those who are going out through the State to teach those growers and handlers of fruit the things they should know.

Mr. Tyson then presented his address as follows:

HANDLING THE APPLE CROP.

By C. J. TYSON, *Floradale, Pa.*

Before taking up the handling of the apple crop, as is my purpose to do, I would say that I consider this one of the most profitable crops to be grown on the farm; a crop, to the growing of which, many parts of our State are well suited. Five hundred to one thousand dollars per acre are not unusual gross returns, giving net figures of more than fifty per cent. of these amounts. One eleven-year old Pennsylvania orchard, last year, returned over \$250.00 per acre: this on a 40-acre area. Another orchard twelve years old, gave nearly \$400.00 per acre. We hear stories of the large profits from orchards on the Pacific coast, where good orchard land is selling around \$1,000.00 per acre. The figures given above were realized in our own State of Pennsylvania, on land that a few years ago could have been bought for \$50.00 to \$75.00 per acre. Not a particle better than thousands of other acres in the State that may still be bought at these prices, or less.

I hear some persons saying that too many trees are being planted, and that very soon there will be no market for the great quantity of apples produced. There need be no immediate fear of over-production so long as we devote ourselves to growing only good fruit. Someone has said: "Apples will not be over-produced until every man, woman and child in the land has all the apples he can use, and gets them at a moderate price." I believe that condition to be very far remote.

Handling the apple crop for home use probably need not be considered here, except that care against bruising, and protection from evaporation will add much to apples intended for home consumption.

Apples wrapped in paper will keep much better than when not wrapped. This is particularly true with high quality apples of the Grimes Golden, Jonathan, Stayman Winesap type.

We shall consider the matter then from a commercial point of view; and for this purpose, the orchard interests in any place should be on a fairly large scale to give most satisfactory returns. I mean by this, than an acre of orchard here, and another there, remote from other interests, will probably be disappointing, unless a strictly retail trade is to be supplied. There should be enough trees in a place to produce at least one carload; and from that point up, the selling conditions will improve as the quantity increases. The reason for this is very plain. Many of us prefer to sell our fruit and produce for cash at the loading station. The largest and best cash buyers go only to neighborhoods where large quantities of fruit or produce can be bought, for the reason that expense of looking after small lots is too great, consequently competition is greater, and better prices almost invariably are paid where fruit is plentiful. I therefore recommend that fruit growing be conducted either on a large scale by individuals, or by a community of small growers. Handling the apple crop is clean, pleasant work, which anyone may engage in honorably. It affords opportunity for careful, painstaking effort, and plenty of employment for the brains of the operator.

In the first place, we shall assume that the fruit has been well-grown; that the trees have been pruned, so that each limb and branch has room to bear its load of fruit without crowding or seriously shading any other loaded branch, the centers open to admit sunlight, and a free passage of air; that the tree and fruit have been carefully and thoroughly sprayed for scale, if that pest is present, for codling moth, which is always present, and for the many fungus troubles of fruit and foliage; that the trees have been well fed with a ration balanced to meet their needs—a matter which only experiment in your own orchard will decide; that the question of moisture has been carefully seen to in the orchard by thorough cultivation where conditions will permit, or by heavy mulching where the ground is too steep for cultivation; and that the fruit has been thinned when trees have set an overload. This is a practice not generally followed in the East, and yet when thinning will increase the value of apples fifty per cent., which the past season has proven, we may well look into it. Thinning not only improves the size, but removes a working place for insects and fungi, which operate between close-hanging fruits.

Shortly before starting to pick, all dropped fruit should be gathered from the ground, and removed—partly to save it from decay and trampling by the pickers, and partly that the later falling fruit shall not be mixed with it.

Do not pick the apples too early. To my knowledge thousands of barrels of apples are each year hurried from the trees and into market in a green and immature condition, which interferes with selling at full prices, and even affects the keeping quality of the fruit. Apples should hang on the trees until they have attained nearly the full normal color for the variety, and until they can be picked without pulling out stems or breaking off fruit spurs. Good, full color adds almost one-half to the market value of an apple. This is not entirely a matter

of looks, either, for the consumer has learned that the matured apple has a greater amount of sugar, consequently, better flavor, than a green one.

Apples that are mature and well colored are found to scald in storage much less readily than immature fruit. In this connection many growers overlook the fact that apples grow wonderfully in the last ten days before full maturity, adding bushels every day that they so hang; much more than balancing the small loss that may occur from dropping.

At this point we must consider the package. Large quantities of western apples have been coming to our markets in boxes, holding about a bushel. In most of these boxed shipments each apple is carefully wrapped and placed in the box by hand. Other shippers do not wrap; and still others lay a face only and pour in the balance of the apples. Some eastern growers have tried box-packing in the past few years, and are finding it decidedly profitable. I strongly recommend that more of our growers look into this method and try it, at least in a small way. Personally I have had but limited experience in box-packing, and shall not attempt any extended discussion of the process.

I must acknowledge that I do not share the opinion of some public speakers and many writers, that the time is fast approaching when the box will entirely replace the barrel as a package for apples. Indeed I question whether the proportion of boxes to barrels will ever become much greater than in the past season.

Owing to the greater cost of box-packing, this method is not profitable except in case of the best grades of fruit. Not all apples are good enough for box-packing, and must be handled in some other way. Moreover, box-packing is slower; and in the rush of handling a large crop, it is not always practical, on account of time. Then, too, certain trade demands apples in barrels, even the best grades. Especially is this true of the Southern trade, which is now taking a great many Pennsylvania apples.

The box has its place with the consumer who wishes to buy only about one bushel of apples at a time, either through regular trade channels or direct from the grower. This trade will undoubtedly grow, but probably not out of proportion to the regular trade in barreled apples. Many dealers who formerly bought boxed apples, because of the uncertainty of barreled fruit, are learning that there are growers of apples whose brands can be relied upon, and are now buying eastern grown apples in barrels. They can get an equal value at a lower price.

Do not understand me to say that I favor packing poor apples in barrels, for I most emphatically do not. Poor stuff, barreled and put up regularly on the market, in competition with good apples, has a demoralizing effect on the whole market. The apple trade of the season of 1907-08 was a very good illustration of this point, where an already weak market was completely destroyed by being flooded with thousands of barrels of poor apples. Similar conditions seriously hurt the market the following season. In fact, certain sections have gained such a reputation for barreling poor fruit that many years of fair dealing will be required to set them right with buyers of apples.

It is much better to sell these low grades locally, if possible, to supply the small town trade from wagon, if the supply is small; or, if the quantity is great, sell to cannery, fruit evaporator, or cider-mill. If

none of these give a satisfactory outlet, load the second grade stuff in bulk cars and ship in that way. In recent years the market for bulk apples has come to be a regular thing, and much of the cheap trade in the cities is supplied in that way, without adding cost of barrel package.

If two or more varieties of apples are to be shipped loose in the same car, it is very important that they be divided by a wooden partition. Attention to this point will often add one-third to the returns from the car.

The ideal solution of this poor grade problem is, of course, to grow up no low grade fruit, and we have not secured the best that our business affords until we have closely approached this ideal. Lack of thoroughness in the things we already know is the reason why most of us fall short in this respect:

In barrels, as in other packing, we should have in mind the safe and satisfactory arrival of the fruit in the hands of the consumer or retailer, not only its passage from our hands in exchange for a sum of money. For, if we are in the fruit business to stay, either as grower or dealer, no other kind of advertisement will go as far, or carry so much weight, as well-graded and well-packed fruit, plainly branded with the name and address of packer.

Then let us see that the fruit is handled carefully. It is not always possible for us to control this matter absolutely; but it should be watched all along the line.

Half-bushel, drop handle baskets, each provided with a light iron hook to hang from ladder step or limb, will bruise the apples much less than when picked into a bag. There are two reasons for this; first, in the basket the apples lie where they fall, while in a bag they are constantly moving over each other with every motion of the picker's body, resulting in many slight bruises, not noticeable in many varieties, perhaps never in Ben Davis; but in most kinds detracting greatly from the appearance of the fruit after being stored a little while. Then, nearly always a few apples in such bag are bruised between the picker's body and the ladder steps or limbs of the tree, to such an extent that they must be discarded at once. I have had an opportunity to watch this matter very carefully and it does work out.

In picking apples, where trees are not too high, I like a step ladder. A convenient height is eight or ten feet, and the ladder should be made with but three legs, so as to stand solidly on uneven ground. For high trees I use a ladder, the side rails of which come together in a point at the top. This ladder can be pushed up between branches without knocking off fruit, and requires but one point of support at the upper end. In picking apples from a tree heavily loaded with green fruit on the under side of limbs, I am satisfied that it is entirely practical to make two pickings; and that the green apples, left ten days or two weeks, will improve enough in size and color to pay well for the extra work. Picking should begin on the lowest limbs, and proceed upward. This saves many apples from being knocked to the ground by pickers.

For barrel packing, if at all possible, the fruit should go directly from tree to a packing or sorting table, and at once enter the barrel. If, for any reason, this cannot be done, another course is open. Either pour carefully into bushel crates or into the barrels, which are to be

used later. Remove the heads and place them in the bottom of the barrel; and lay a corrugated cap or paper cushion on top of the head, to prevent cutting of the fruit. Then haul to the barn or packing shed, and store till ready to barrel. In this way all the available help may be employed in picking; and the packing may be done on rainy days. Neither boxes nor barrels should be made quite full.

Never, except under the most extreme necessity, pour into piles on the ground. This will mean unnecessary bruising, a good deal of decay and a lot more work every time.

The sorting table may be made in several ways. My preference is for a frame of three by four stuff, six feet long by three feet wide, and covered with burlap, canvas, old carpet, or any strong material which will form the bottom of the table; faced all round with a board, which extends an inch above the frame, to form an edge. This edge, with the sag of canvas cover, gives capacity for two or three barrels of apples. The table is supported by two trestles or by three barrels. It stands as nearly level as may be, and each apple must be picked from the table by hand. The operation is not a slow one. The operator, looking before him sees one side of the fruit. He takes two apples in each hand, (unless very large) and turns up the other side, then, with a quick motion of the fingers, the grades are readily divided into their respective baskets, at side and end of table. For this purpose a round half-bushel, drop handle basket is best. This basket can be lowered to the bottom of the barrel and then turned over by hand. I like this method, because I believe more thorough culling and better grading can be accomplished with less bruises than with any other form of table.

Use good barrels, of full standard size, head $17\frac{1}{2}$ inches, bulge circumference 64 inches, length of stave $28\frac{1}{2}$ inches. This is the standard New York apple barrel, and contains 7.026 cubic inches.

If possible, get barrels made from well dried staves, by expert coopers. Green staves will dry out after filling, and leave the barrels loose, while poorly made barrels will result in much vexatious delay at a time when every moment must be made to count. The importance of a neat substantial package is often overlooked. Avoid barrels made with sawed staves, which gather dirt from the time they leave the cooper; and often arrive at market in a dingy condition. Insist, also, upon cut hoops of good quality, and upon clean white heading, preferably of some rather hard wood.

See that the croze, or groove, is cut to a good depth, and yet that the ends of the staves are not cut off. Chestnut staves make a good, substantial barrel and are my preference. Elm is substantial and looks well; but beware of willow, cottonwood, or any similar soft material for staves. I speak strongly on this point, having had some costly experience.

The next operation is to cooper the barrel. Turn up the face or head end, drive down the quarter hoop and put in two nails; tighten the end hoop, and drive four nails, starting the nails near the upper edge of the hoop and slanting them well toward the ends of the heading. Use $1\frac{1}{2}$ inch polished cut nails for this purpose. Nail head-liners, which have first been soaked in water, across the ends of the heading, using three or four $\frac{3}{4}$ inch polished cut nails to each liner. Some per-

sons do not use head-liners, but it gives the barrel a more substantial appearance and is required on export apples before they will be accepted by vessels at point of loading. A good deal of annoyance will be avoided if liners are of good, tough material. Elm is probably best with one edge rounded.

Liners need not be more than twelve inches long, greater length being harder to put in place. Now, reverse the barrel, drive down and nail the other quarter hoop; loosen the top hoop and remove the head. Next comes the facing or lining paper, to protect the face of the apples from bruises and dirt. It may be a corrugated cardboard cap, laid with smooth side next to apples; or it may be a simple white paper cap, which keeps out dust and looks neat when the barrel is opened. Handsome red fruit shows up nicely when a lace paper circle is used.

I believe in facing the barrel. When properly done it has the same effect as a neat package or a handsome label. It helps to give the purchaser a good first impression. The apples in the "face" should be clean, bright specimens of about average size for the barrel. Unfortunately, the practice of facing is often abused, all of the fine large specimens being selected for this purpose, and the balance of the barrel filled with poor apples. In such cases the purpose is entirely one of deception, and the good first impression gives away almost at once to a feeling of anger and disgust, and a determination to buy no more of your fruit.

The face should be laid in rings, beginning at the outside of the barrel, and should be fitted as firmly as possible. A second layer is usually placed by hand; then a basketful is turned on top to hold the face from shaking. At this point, or sooner, the barrel should be stood on a solid plank about a foot wide and two inches thick. As each subsequent basket of apples is emptied, the barrel should be well jarred down on the plank. When the barrel is full the top should be leveled off and a ring of apples laid around the edge of the barrel. If the apples have been thoroughly jarred down throughout the filling it will not be necessary for the barrel to be filled much above the level of the staves. A cushion head will help greatly in leveling and settling down the apples.

Putting in the head is the next operation, and for this purpose I much prefer a screw press. It settles the apples gradually and allows free use of both hands. This end also is nailed with four cut nails and secured with liners.

The barrel is then turned back and stenciled with the variety name. In addition to this the packer should be willing to stand back of his work, and should express this willingness by plainly branding each barrel with his name and address. I have followed this practice for several years and have found the results very satisfactory. This means that nothing must go into the barrel that will fail to give value to the man that pays his money for it.

THE CHAIRMAN: Members of the Institute, at this period of our meeting there is to be a resolution offered by someone. We will now hear that resolution.

MR. LIGHTY: The resolution that I have will interest every one of us. It reads as follows:

"The Township Road Bill passed in 1909 is a contract between the State and townships, whereby the State pledged aid to an amount not exceeding twenty dollars per mile and we expect that contract to be carried out. Any other action would discourage and retard the good road movement. To carry out this contract will require about one and one half million dollars a year. We insist that this appropriation be inserted in the Jones Road Bill."

The CHAIRMAN: Members of the Institute, for want of time we will have to forego a discussion of this resolution.

MR. LIGHTY: Mr. Chairman, I move that this resolution be adopted as read.

MR. BARNES: I second the motion.

The motion was put and resolution adopted as read.

MR. BLYHOLDER: Mr. Chairman, I move you that a copy of this resolution be forwarded at once to the Legislature.

DR. CONARD: I second the motion.

The motion was put and agreed to.

MR. BAYARD: I hope your secretary will insert the names of the President of the Senate and Speaker of the House, Chairmen of the Appropriation Committees in the Senate and House and our two senators at Washinton in his report.

I believe it is entirely worth while for members who have friends in the House and Senate at Harrisburg to communicate with them personally and very promptly. I think it is a matter that requires quick action.

DEPUTY SECRETARY MARTIN: I have great pleasure in introducing the Master of the State Grange, Hon. W. T. Creasy.

MR. CREASY: I came here this morning from Harrisburg and I went there particularly in the interest of the dirt roads of Pennsylvania, and in looking over the situation at Harrisburg I thought prompt action was necessary to do something to stiffen up the backs of those Senators who are so much afraid of making any appropriation to our township dirt roads. Now I have studied the road problem for years and I find out in the State of New York they have improved 60,000 miles of dirt roads within the last six years under what we call a bill similar to the Jones Township Road Bill. The impression at Harrisburg has gone out that that the farmers of the State don't know anything about building roads. I will not discuss that here, but I do say this; that if we want roads we will have to fall back on our township supervisors to build those roads, build right to our market towns and railroad stations and to our county seats, the roads that the farmers are particularly interested in. Now we passed a bill in 1909 that promised to give 50 per cent. of the amount of money we raised in cash, not exceeding \$20.00 a mile. The contract is a law on the

statute books of Pennsylvania and what we want to do is to have it carried out, and it will require \$1,500,000 a year, and I believe that this telegram sent to the persons that have been named by Mr. Bayard of the National Stockman will bring the desired results, and I am pleased to see that this convention has passed the proposition. The Pennsylvania State Grange is working hand in hand with the Pennsylvania Farmers' Institute to advance agriculture and I believe your work has been of great benefit to the State and our interests are mutual.

I am pleased to be with you, but I am particularly interested just now in the legislation going on at Harrisburg, because the farmers to build the roads as they should be built are unable to do so, especially in our poorer counties of the State. There may be a few exceptions. I am satisfied that after ten years trial, I am willing to back it up that after ten years trial of this dirt road proposition, if rightly carried out, it will give us more good roads than any other plan developed, and that is the verdict of the engineer in charge of the dirt roads in New York, that if they had not adopted that plan of State aid the highways would have gone by the board after the enormous expenses that were necessary to make them good after several years. So that I am satisfied with the men that understand this road proposition and the farmers who are particularly interested cannot receive any better help than this aid from the State which will only require about \$1,500,000 a year and it is practically the only money we get from the State outside the school appropriations that is any benefit to the taxpayers of the State, and the revenues of the Pennsylvania have increased wonderfully within the last ten years. There is something like \$30,000,000 a year coming from the corporate interests, which indirectly comes from us because the man that gets the freight in the end pays the bill, and so it is up to us to get some of that money and if we don't get it is because we have not conducted this proposition as we should. I believe that if any of you men here are acquainted and know the senators and members of the House it will only cost a quarter and will do a lot of good to communicate with them. As long as we don't ask and let them know, they think it is all right. I urge you people to wire your senators and tell them what you want and they will listen. They are in a mood to listen both at Harrisburg and Washington, more than they have been for years.

The CHAIRMAN: If there is nothing further at this period of the meeting we will return to the regular program. We have some time to devote to questions on Mr. Tyson's address and are ready to hear your questions.

MR. DRAKE: I would like to ask Mr. Tyson to give us a good talk in regard to picking fruit. Have you had any trouble with the fingers checking the apple, the end of the fingers bruising the apples when they are picked off?

MR. TYSON: That is a mighty hard thing to control. If you are picking Ben Davis apples it does not matter. You cannot check them. But in picking Grimes Golden or in fact many other of the more tender varieties that show finger marks plainly it is very hard to get them picked without little bruises.

MR. DRAKE: I endeavored to teach my pickers to catch the apple with the heart of the hand instead of the end of the fingers, but it is so hard that they do not always do it.

MR. TYSON: That is the way to do that.

The CHAIRMAN: The next subject on the program is "A Fortune in 15 Years, and Fruit the Factor." This question was to have been discussed by Dr. J. H. Funk, of Boyertown, Pa. I understand he is not present but he has a substitute in the person of a young man who is said to be a "chip from the old block." I have the pleasure of introducing to you Mr. Sheldon Funk, his grandson.

Mr. Funk then addressed the Institute as follows.

A FORTUNE IN FIFTEEN YEARS, AND FRUIT THE FACTOR.

By SHELTON FUNK, *Boyertown, Pa.*

Mr. Martin has kindly asked me to say a few words on this subject, and the request coming so unexpected as it did has found me entirely unprepared to talk before such an assemblage as we have here this morning composed of the most prominent men in agriculture throughout this great old State of Pennsylvania; and being sandwiched in between Mr. Tyson, the apple king of Pennsylvania, on one side and Mr. Farnsworth, the peach king of Ohio, on the other side, I find myself not in the most pleasant position. I hope that you ladies and gentlemen who are so much older both in age and experience will pardon me for these meagre and very hasty remarks. In regards to my talking upon the subject of "A Fortune in 15 Years, and Fruit the Factor," that is entirely beyond me because I have not made a fortune and besides, being an unmarried man it has so fallen to my lot to receive the smiles of misfortune and not dame fortune.

Nevertheless, having been upon Dr. Funk's place during these particular 15 years and having been associated with him during this time I have become somewhat familiar with his methods and operations in building up a most successful fruit orchard, and it is about these experiences and these observations that I would ask you to bear with me this morning for a few minutes.

It is the consensus of opinion that apples are more profitable and are better adapted to the general conditions than are peaches. First, they don't require as careful a handling, and then again the possibility of being preserved for such a greater period of time it is not as easy to glut our markets. You all know, however, that it requires from twice to five times as long for the apple tree to come into bearing as the peach tree, and this period between the time that the apple tree is set and the time that you harvest your first fruit is the period which the

majority of men of small means fear, and it is one of the problems that must be solved in the apple orchard, that problem of supporting the apple orchard until it comes into bearing. How grandfather solved that problem was by using peach fillers which came into bearing with us the third summer. I know a great many people claim, both in this State and other states, that it is better to use apple fillers than to use peach fillers. All well and good if they can solve that particular problem, then I say use apple fillers; but with us the placing of apple fillers paid practically nothing upon the investment. We support the peach trees by planting potatoes between the rows the first two years. After the second year we practice clean cultivation and cultivate constantly from the beginning of spring until the middle of July, depending on the weather conditions. In the apple orchard, however, owing to the fact that it is situated on a very steep hill we have thrown it into sod so as to prevent erosion.

Peaches so far have been very profitable with us. I cannot give you the exact figures for last year's operations. The prices were lower than in some preceding years, but I think I am safe in saying that the gross proceeds for the season averaged close to one dollar a basket. Our transportation charges are five cents. We have a good and easily accessible market in Reading. The picking, packing and hauling cost seven or eight cents. Although this pruning, thinning, spraying and cultivation costs considerable, you notwithstanding can easily see that there is still a very handsome profit on your investment. Grandfather has about 20 acres in apples. I think 14 or 15 years old and this last year he had close to 900 barrels which realized him about \$5,000 together with the pickups and culls; so that you can see that there again is a very nice profit, and this orchard is just coming into its prime and this year there promises to be a greatly increased yield.

Now one of the chief reasons, in my mind, for this success is the fact that he thoroughly understands the fundamental principles of fruit culture and carries them out to the minutest detail. Many a time that good peach money went into that apple orchard and those trees had to be treated just right; they had to be nursed through babyhood until now they are becoming giants ready to bring forth their luscious fruit and pay back in golden shekles for the careful treatment they received in younger days. And therein, gentlemen, lies the fact why there are so many failures not only in horticulture but in general farming as well. If we would become a successful horticulturist it is not sufficient that we know that if we put the tree into the ground and if it receive a fair supply of rain it will grow and produce a large tree and will bear beautiful fruit. No, we must know why that tree grows and how it grows. We must carefully keep trace of the statistics of this State and other states so that we may be able to determine when we wish to plant an orchard what kind or class of fruit is going to be in most demand in our locality.

After we have determined the class, we have to determine the particular varieties, the best adapted to our soil, climate and market conditions. We have got to know what kind of fertilizer to use to produce the maximum quantity of that fruit. We have got to prune, spray and cultivate it. In short, we have got to know all the fundamental principles covering the growth of that tree from the time it is a sapling until it reaches mature age; and when we know these we

have a golden opportunity before us when we plant our orchard. Of course, in this world there are all kinds of opportunities for some men and none for others. For instance, I see a fertile field out here. If I know nothing of farming that is no opportunity for me. I would starve to death. If I am an ordinary farmer, practicing the same methods as my remote ancestors, possibly I can make a living from that field; but if I am a scientific farmer that field is a great opportunity for me and presents great possibilities. The other day in Harrisburg one of the legislators seemingly ridiculed this farmers' institute work, that there was too much theory in it. Gentlemen, I have never been afraid that the majority of our farmers will get too much theory into their practice. I think they should have more theory. To make them think and sit down and work out the problems and try a little bit of theory in their general farming operations. There are too many things on which we do not have the whys and wherefores. For instance, about this time of the year we fruit men are spraying for codling moth and curculio. What would it avail us if we knew nothing of the habits of life and the methods of control. It would avail us nothing. And this, gentlemen, is the reason why some farmers are able to make a success and other farmers make a failure. There is no doubt a great opportunity in this old State of Pennsylvania, for the right kind of men, for Pennsylvania is being stirred up along the lines of horticulture such as never before, and if there is any one reason why I am proud of being a Pennsylvanian it is because she is able to produce fruit of the highest quality and within the next decade she is going to increase that fame until distancing all competitors.

The CHAIRMAN: Is there any questions to put to Mr. Funk?

A Member: Mr. Chairman, he is a chip of the old block, all right.

A Member: In reference to the dwarf apple, are they a success to use as fillers?

MR. FUNK: I do not know much about dwarf apples. I think some are highly recommended in some parts of the State, especially in York county. We do not plant any Wageners as fillers.

Member: There are some parties grow them entirely?

MR. FUNK: Yes sir.

The Member: Is that profitable?

MR. FUNK: I don't know. I hear discussions pro and con and I would not like to say. I never had experience. Van Alstyne, from New York, seems to think it is not.

A Member: Where do you do this dwarfing?

MR. FUNK: I do not know. I am not familiar with the dwarf apples. Mr. Tyson can tell you more about that.

A Member: I would like to know a little about the dwarf apple.

MR. TYSON: The dwarf apple is produced by fruit grafting on stock of a dwarf character which produces that dwarf characteristics of the other plant; and any variety, any standard variety of apple can be dwarfed by working it on this dwarf stock. As to the profitability of it, I question it very much. It seems to me that giving a little more room to a standard tree has very much greater possibilities. I think it is entirely possible to have good results from using apples of a dwarfish nature, such as possibly the Wealthy and Wagner; but restricting the natural growth of the tree by working on dwarf stock I question.

MR. JOEL A. HERR: I would like to call attention to the fact that this room is a hard room to hear in and I would ask the speakers to speak a little louder and distinct because half the audience cannot hear what the speakers are saying.

The CHAIRMAN: Mr. Funk, I would like to ask you a question. You have knowledge of the character of the orchard inspection going on in the State of Pennsylvania at the present time?

MR. FUNK: No sir; I have not.

The CHAIRMAN: Then you cannot answer my question?

MR. FUNK: No sir; I have no knowledge of that inspection.

MR. DRAKE: I am contemplating putting out an apple orchard. The question comes up of fillers. We have a good many peach trees now. In talking with a nurseryman he advises to use as fillers dwarf pears. I should like to know whether Mr. Funk or any other fruit grower have had experience or can advise me along this line.

MR. FUNK: In regards to the question of pears, it is my personal opinion that in a few years there is going to be a market for pears, because wherever you go you find very few, only the Kieffers. I think there is going to be money in pears if you have a good market for them. There is a market for Kieffers in the coal regions and also in New York, but you ship Kieffer pears to Philadelphia and you cannot realize anything on them.

A Member: How do you regard them for canners?

MR. FUNK: All right for canners; best in the world.

A Member: Can you buy them in cans in grocery stores?

MR. FUNK: I don't know about that.

A Member: I have heard of Kieffer pears being labeled as Keiffer Belle.

A Member: How long can you prolong the life of a peach tree by dehorning?

MR. FUNK: Some men claim that they can prolong the life of the peach tree to a great extent by dehorning and I think it is very practical if you are not too badly troubled with yellows. That is one of the great troubles with us. When our peach trees get up into ten, twelve years of age why the orchard is broken up with yellows and it does not pay us any more to let these trees stand and dehorn and keep on cultivating. Last year in the spring we had a severe snow storm and it drifted in on one part of the orchard over the tops and they went down and broke to pieces, leaving one limb or so, yet nice trees can be made out of them a year hence. The yellows are most too bad for us to practice that and when up to ten or twelve years old we tear them out.

A Member: There was an old man in our section of the country had a peach orchard ten or eleven years old, badly broken down with the yellows and he practically never made much out of the first growth of the trees. About four years ago he went to work and dehorned these trees and he cut them short and last summer he had a fine crop of peaches, some of the good old kind that we raised before the disease struck us and these trees are thrifty and healthy and look like they would last for ten years yet. If this dehorning is a success you ought to do it.

MR. FUNK: How far apart did he have his peaches planted in the first place that he did not get a first class crop at the first growth.

A Member: 20 to 25 feet.

MR. FUNK: There was no reason then why he should not have gotten a crop of peaches on the first growth if on the second growth. I though possibly he made the mistake of planting them too close.

A Member: No, that was not it. He did not give them attention. The cultivation was poor and the soil the poorest I know of, not worth a dollar and clean of plant growth. He has an old horse and he told me he let it out all day and it would go up close to the trees and not touch one. He has had marked success. I think it is better to grow the apple orchard faster instead of using the fillers.

DR. FUNK: We like fillers but we are able to tear them out when the time comes. We have conscience enough to cut down these fillers when the time comes.

A Member: In having your fillers of peaches and fertilizing with different fertilizers does not work in that particular sense.

MR. FUNK: There is a great difference between the proper fertilizer for the peach and for the apple. However, in the first few years of growth of the orchard when we plant with peach fillers we make no difference. We usually fertilize nearly alike. We don't use much nitrogen, sometimes a little, 2 per cent of nitrogen; and from then on the apple tree should have more nitrogen while the peach tree should have more phosphoric acid and potash. In peaches our formula is possible 1-6-5, to 2 per cent. of nitrogen about 10 per cent. of phos-

phoric acid or even higher to 14 per cent. and 10 per cent. of potash; while on the other hand with the apple I would rather have about 4 per cent. nitrogen, 10 per cent. phosphoric acid and about 5 per cent. potash.

A Member: Do you recommend barnyard manure for peaches?

MR. FUNK: No indeed, there is too much nitrogen in it. If you put barnyard manure on peaches and cultivate constantly you will have the trouble they had in Lancaster county and different places this last year, owing to the fact that there was a late fall and the trees were in good growth and did not harden up and froze back and you get the same results from barnyard manure. There is the trouble with our barnyard manure. It is not practical on our soil.

A Member: This old man has a shed and keeps his horse up there and makes a little manure and he likes barnyard manure for his peach trees and where he spread it they made a better growth on that poor soil.

MR. FUNK: That makes a difference. If the barnyard manure was put on good soil it would make too much growth. If you have thin soil I do not believe barnyard manure will hurt the tree after it gets up in age.

A Member: What do you do with the peach borers?

MR. FUNK: In the spring of the year we go in the orchard real early and back up our trees six or eight inches so that when the moth of the peach borer lays her eggs on the trunk of the tree and these eggs hatch out and the larvae go down into the ground, they dont get into the roots if you have six or eight inches of ground around the trunk of the tree you will have the borers where you can easily get at them in the fall. Then in the fall we take away this ground and dig out the peach borers and in two weeks go over them again and wherever there is a peach borer you are able to distinguish it by the residue left there; after we have done over the second time we bank up again and let go to the next fall.

A Member: You just bank up with ordinary soil?

MR. FUNK: Just a little to keep the larvae from entering the root.

The CHAIRMAN: Now Ladies and Gentlemen, I have the pleasure of introducing to you Mr. W. W. Farnsworth, of Waterville, O., who will speak to you on "Horticulture; Past, Present and Future."

HORTICULTURE: PAST, PRESENT AND FUTURE.

By W. W. FARNSWORTH, *Waterville, O.*

This topic has a wide range because I did not know the character of the audience I was to address. In coming here from Ohio yesterday, speeding along past the farms and cities, my mind went back to the time 75 years ago when my mother left this country, traveling across the country to the Far West of Ohio in the old Conestoga wagon, and I thought of the great changes in transportation since that time and wondered if the agriculturists and horticulturists had kept pace with improvements in other lines, and I thought possibly just a few moments spent in looking over the advance in horticulture might be of value to us in forming a little better analysis and arriving at a better understanding of our conditions at the present time. That does not mean that I am going to give you the history of the apple from the Garden of Eden to date because most of us live in the present. But we realize that in the early days of horticulture it was a simple matter of planting and God did the rest and fruit thrived luxuriously. All that was necessary was to plant and harvest, and the market was uncertain and unreliable; sometimes a little demand, but in the main it was well supplied with the products of the farm orchard. Then later there came a period when the insect and fungus enemies began to arrive and we had no means of combating them. Horticulture was shrouded with superstitious and foolish theories without any sense or foundation. Once in a while they hit it but oftener missed it. I remember about that time I was secretary of our State Horticultural Society, and one of the questions which I put on the program was this: "Will it pay to plant an apple orchard on land worth \$100 an acre?" and leading horticulturists of our State discussed this question and decided it would not; that the apple crop was so uncertain and when we received a crop the price was poor; that the part of wisdom was to plant lands of no value for anything else and what was received would be clear gain. But at the present time we feel that the best way to receive a profitable return from land worth one or two hundred dollars an acre is to plant an apple orchard.

What has brought about this change? About the time I speak of scientists, agriculturists and orchardists began to study these problems. They began to realize the fallacy of laying down hard and fast rules: such as sow your turnips on the 25th of July, and other fallacies; and they began to understand that we must study the underlying principles and know more of the requirements of our trees and then to try to provide these requirements under the most available conditions, and the progress has been such in the last 15 to 20 years that horticulture has risen from an occupation of uncertainty and mystery and unsatisfaction and has now attained a state where it is considered one of the safest and most profitable of commercial ventures, and business men and men of all ranks and professions of the city are beginning to realize not only its pleasures but its profits. I

think we had a splendid demonstration of that this morning and just as soon as we have such a young man as Mr. Funk in every township of Ohio and Pennsylvania then horticulture will make wonderful advance and will become one of the most profitable and interesting industries in our country.

We need more men who will study the needs of the trees. Dr. Roberts, of Cornell, was once asked by a dairyman how a certain ration or combination of foods would affect the dairy cow. His answer was: "Don't ask me; ask the cow." We want our trees. It is well enough to ask each other what food to give the orchard, but after all we must ask the trees themselves; we must study nature closer and watch the effect on the trees. The experiment station and agricultural society can make suggestions and can help wonderfully, and I do not think anybody can attain the highest measure of success, can do himself justice, unless he gets all the aid possible from them. Life is too short to try to dig these things out for himself, but he must take their suggestion and put them into practice. The experiment station can give us the verdict but we have to execute it ourselves. We must modify all their requisites to suit our individual cases.

I was much interested in the statement of Mr. Funk that while he would not advise putting manure on the young peach orchard it was all right later on when a particular case was cited. In handling the peach orchard we must have a good growth early and cover crop later in season. I am not afraid of excessive growth early in the season. I have a bearing Elberta orchard, bearing moderately in 1909, and we gave it a liberal application of manure from the steers sheds, reinforced with acid phosphate. We got a great crop in 1910. This year we are putting on the manure again not on the young trees but the mature trees, and have another heavy crop on the trees; so if we say in a general way, use manure on your peach orchard and you don't use judgment it would do you greater harm than good. It would be like the gentlemen who imagined he had many physical ailments and he read all the circulars of patent medicines and all medical reports and prescribed for himself, and a medical friend said: "I am afraid if you are not careful some of these times you will die of a misprint." Some of those who are accepting all reports with an occasional misprint in them can realize what that means, and if we are going to take these statements without analyzing them ourselves and questioning whether they apply to our own needs, some of the trees and orchards will die of a misprint.

We want to realize that there are certain requirements that all trees have in order to succeed. One of the first of these is moisture. Now to secure that moisture we must store up and utilize as much as possible the natural rainfall, for I take it that irrigation is not to be considered in this climate; in fact, I do not consider it necessary in orchard culture; but if the soil is not naturally well drained it should be underdrained thoroughly. This will not apply to all Pennsylvania conditions, but it does with us because my orchard ground is thoroughly underdrained with tile three feet deep. We not only remove the surplus water objectionable to the tree but build up an aerated soil and reservoir to save and take up the moisture that falls during the winter and spring and then by cultivation or mulching, for I use both methods, we preserve that moisture for the use of the fruit, for

you realize that fruit is largely composed of moisture and we know that the more water we can get into the peaches and pears the larger the price we receive. There is another aid to storing moisture and that is filling the soil with humus. We cannot get the best results in fruit culture unless we have a soil full of vegetable matter. This not only adds a food value to the soil by adding that which is positively plant food but it makes available the plant food already in the soil, the manural elements of the soil and also fits it for storing a largely increased amount of moisture for the needs of the tree and fruit during its development.

There are various ways of securing this humus in the soil. No one way is best fitted to all conditions and cases. Orchardists will follow different methods. Now possibly to give you the greatest information in the limited time I will occupy I might just briefly speak of my own methods in this connection. Sometimes it may seem egotistical, but after all we like to hear a man tell what he knows about rather than theorize on what may be done or should be done. The life history of my orchards may be divided into three classes or ages. First, the young orchard for several years after planting. I mean apples, pears, peaches, plums and cherries. We plant the young orchard and grow other vegetables, potatoes usually or small fruits in it, and in the small fruits we grow mostly strawberries and currants. I formerly grew raspberries and blackberries in the orchard but don't think they are quite as well adapted, and for the last few years am not growing blackberries or raspberries for the reason that the marketing of them interferes with the harvest of our currants and cherries which we find more satisfactory and more profitable. In the peach orchard we grow nothing but potatoes. I have grown strawberries in the peach orchard once or twice. The first year after strawberries are planted it is a good crop for the peach although the strawberry wants to be cultivated late in the season and there is a little danger, in excessively rich ground in planting strawberries on the peach orchard, of forcing a late growth the first year. But if you can avoid this you can safely plant strawberries in the peach orchard, especially if you take the plants away from the trees the next spring and then throw a liberal amount of mulch up around the tree to preserve moisture. But it is not an ideal crop for the peach orchard. We prefer potatoes the first two years. After that we cultivate clean the forepart of the season and how much and how late we cultivate depends on whether they are making little or full growth. This, of course, you understand is to preserve the moisture and make available the plant food.

So much for the peach. With the apple, pear and the plum especially we prefer to plant currants. We don't want our whole acreage in currants; but on the richer ground we find them an ideal crop to grow in the orchard. In other words, in the orchard where we don't plant currants we grow potatoes and strawberries and alternating, keeping this up for five or six years until the trees begin to bear quite freely, not heavily, of course. Then we begin the second stage of the life of the orchard, and this consists of cultivation and clover crops, beginning as early in the spring as possible. This is where many make a mistake, especially those divided between orcharding and farming. We plant the corn and sow oats and then go in and plow the orchard; and that corn crop may yield between \$20 and \$40

per acre and to get that in the best condition you are neglecting a crop that may return you all the way from \$400 to \$1,000 an acre, as Mr. Tyson and Mr. Funk have stated. The orchard needs that moisture that is being lost every day the ground is not stirred, the orchard needs that and will return better pay than the oats field or corn field.

Work at the orchard first. There may be a little modification of this in some instances. For instance, you have sand vetch growing in the orchard,—and I consider that an ideal cover crop in many instances,—if the orchard is reasonably young and not needing a heavy supply of moisture, you will be justified in leaving that stand late, for the sand vetch is not quite the ideal from the fact that the ideal cover crop should make its growth in the fall, die down and be plowed under in the spring. We have not found that ideal cover crop yet, but sand vetch does not seem to rob the ground of moisture as rapidly in the spring as other crops. If we let it stand a week or ten days later than this and then plow under in our orchard the little moisture we lost is compensated by the vast increase in fertility. I have another orchard that I have rented, several miles from home where we can not apply barnyard manure. We have not tried to grow anything in it and this year we are using soy beans. I have had the ground plowed and will drill in soy beans in a few days. This orchard is planted 35 feet apart each way and the trees are young and we can grow a cover crop during the coming season. For a cover crop to occupy the ground at this time of the year I think there is nothing equal to soy beans. We put them in with a grain drill, allowing every third hole to run and cultivate with the sulky cultivator. That means cultivation of the orchard through growing season and at the same time you are growing a great deal of fertility there that is valuable. I believe as a rule you can grow fertility in a young orchard cheaper than you can buy it in sacks; I believe as a general rule you can do this. This is the second stage of our orchard. Then in some of our orchards, especially the apple orchards, where we made a mistake early in life by planting too closely together, we have adopted the mulch method, letting a little grass grow and hauling in old straw and corn stalks and coarser manures, anything to make mulching material, and mulching those trees. If I had unlimited quantities of mulch I would prefer that method to cultivation, as it answers the same purpose and has the same advantage, but it requires a great amount of material, and I think those situated on level ground where we can cultivate will find cultivation better, although I have seen at the Ohio Experiment Station their plots mulched have made better growths than the cultivated plots; but on my own soil I have not got those results, so that where ever possible I practice clean cultivation. Perhaps that is enough time spent on the cultivation.

Now just a word or two in regard to spraying. I feel we are learning new things every year about spraying. I believe we have been taking these recommendations too generally without discriminating, I think, as to our own particular needs. We have not stopped to ask whether we needed a fungicide or insecticide and have not been thorough enough in application and prompt enough. I believe it will pay every orchardist to use every means in his power to have plenty of power and spraying material on hand, keep one or two extra outfits

on hand, so that if anything happens we can go on with the work to advantage and at the right time and we must have outfits enough to use the winds when just right. It is an advantage to give over three spraying and four if possible. Last year I only gave two sprayings. Don't understand I am advising this. I would not advise it under many conditions, but in our region we are not troubled with the bitter rot and other fungi and when spraying through the dormant season we spray for San Jose scale and scab, and that with us is sufficient; and then as soon as the blossoms fall we give another spraying, drenching the trees from three or four sides with dilute lime-sulphur and arsenate of lead and then feel secure that our crop will be perfect. Last year I had some careful tests made. Prof. Green and his assistants conducted the experiments, and after being there a week he found less than one-half of one per cent. of wormy apples. This was after one spraying after the blossoms fell. That was not in old neglected orchard. I did not think it would be possible by the most diligent work to secure these results the first season in such orchards. This was an orchard sprayed for twenty years and in good condition to begin with.

There is another point that I think perhaps is not thoroughly understood by some in the cultivation of the plum. We have some perfect results in the cultivation of the plum in protecting them from the curculio by spraying three or four times. Our method is simple. We spray with the lime sulphur concentrated solution, 33'' Baume diluted one to forty for plum, cherry and pear; add 2 pounds of arsenate of lead to 50 gallons of the mixture. This was for the first spraying after the blossoms fell. We prefer to spray the plums from one side and then wait for three or four days and spray from the other side and then again repeat. We have sprayed last year I think five times, three times on the one side and two from the other. The second time over we omit the lime-sulphur and use milk of lime in its stead with the arsenate. There is cumulative effect of lime-sulphur when used once or twice successively and used with the same strength a half dozen times in succession there is danger of injury from the left-over accumulative effect and in order to avoid this the second spraying we omit the lime-sulphur. I spent half an hour yesterday looking through our plum orchard and did not find a single plum showing the curculio mark. This year we have only sprayed three times. We had a full set of plums and no signs of curculio and if a few should appear we have plenty of fruit left. About the time the plums color we repeat this process, using the same mixture and about the same number of applications. The great bugaboo in plum culture has been the curculio and rot. Last year we had practically no rot. I told my son to count carefully all the plums that showed it. He packed 83 bushels one day and reported he found three plums in the day's picking had any indications whatever. You know what that means.

Let me give you another lesson we learned last year, in regard to thinning. We make a practice of thinning all our fruit and last year after thinning the peaches we went into the plum orchard, thinning all the orchard excepting the south half of two rows, then cherry picking came on and we did not get back to the plums for five or six weeks when the rest of them were thinned. At picking time we found those that were thinned early were easily fifty to seventy-five per cent. larger than those thinned later, and when blooming time came this

spring where we did not expect fruit we found that the entire orchard was full of bloom and set plenty of fruit except those two half rows that were thinned late. They had nothing while the other end, the same variety, thinned earlier, had plenty of bloom and set a heavy crop of fruit.

Probably I might just as well speak of thinning here as later. I think Mr. Tyson spoke of the advantage. I know the larger grower of fruit will say it is impractical but it is not, it is much better to do it early. The time to remove and pick off part of that fruit is from June to July. Some thin up to October. Suppose you have a tree with 10,000 apples on and it should not have over 5,000, which is the easier and better? to pick 5,000 of the small ones of early and then in the fall pick off 5,000 good first class apples that will bring good prices and please the customer; or to leave them all on and have them all of an inferior size and quality to pick off in the fall if they have not broken the tree or prematurely fallen. Thinning makes less work in the whole and is more profitable. I spoke of 10,000. I wonder if you ever counted the number of apples on a tree? Last year when the thinning test was being made they counted the apples taken from one Grimes Golden 23 years old. They removed at least 5,000 and still left too many on for a good big crop; another tree they removed 6,500 from.

Just a few words in regard to the marketing and picking and I will leave the rest of the time for questions and discussion, for I believe that is the most valuable part of the meeting. We can only undertake in these scattering remarks to hit the mountains, but when you ask the questions I know the information you are after and I may be able to give some. I was glad to listen to Mr. Tyson's remarks in regard to handling fruit. I believe more people fail in gathering and marketing them in growing and especially is this true with those whose education is largely as farmers. It does not require much skill to grow a crop of wheat or corn and haul it to the elevator. Another thing, there is not an awful margin between No. 2 and No. 3; and that is one of the reasons why skill and excellence and care pays a larger premium in growing fruit. To begin with, to harvest a crop properly, we must have the fruit well grown; it must be thinned and as early as possible after the June drop, for every day that the fruit remains on these trees it is sapping that much of the energy and vitality of the tree that should be preserved to perfect these specimens left.

We find it a decided advantage to have varieties and succession of fruit. One of these advantages is you can keep the uniform help throughout the season. The most of our fruit is sold to grocers and consumers; very little through commission men. We get up a trade and hold it, starting with strawberries and lasting the entire season. We have early apples, peaches, pears and plums, so that it is a continuous performance from the time the strawberry begins until next spring when the last storage apples are gone; and having trained help we get better work and more careful work, because the steady employment will improve them. The question was asked in regard to preventing the scars pinched with the ends of the fingers. There is nothing that helps as much as object lessons. I had some new pickers one year and we started on Grimes Golden which shows the bruises rapidly. I picked up half dozen apples which were picked with the

ends of the fingers and I told the pickers to look at them the next day. The result was a little black spot. That meant a great deal more to them than any words I could express. I think it pays to make a point. We had two or three peach trees in the sour cherry orchard and not spraying the sour cherries for scale we neglected the peach trees and the result was we had a lot of curled leaves. I took occasion to call the attention of the new men to it and the old men too. It don't hurt any of us to be reminded of what we know, and there is no way in the world that you can impress the importance of things I think as by showing the results. I think one of the things the apple growers want to do is to grow apples of quality and the next thing is to get them direct to the consumer with as few go-betweens as possible. This won't apply to all. Those who are growing large quantities of apples in a commercial way, who don't do anything else and have not the transportation to reach the consumers direct will do better to sell in carload quantities. But there are a great many of us who could do better by storing our own fruit and going direct to the consumer, and that will appeal to the consumer and customer and will be likely to get more for you. That is the opening for the Eastern apple, and if Pennsylvania, Ohio and New York will live up to the opportunities in this direction and take pains and care to grow the best they can grow and put them on the market in distinctive packages and with a distinctive label so that the customer may know when he gets them and realizes that they come from Pennsylvania, Ohio or New York, we can drive out the Western apple from our market; and we must educate those who know quality by appearance only, because we can beat them in quality and very nearly equal them in appearance; and if we put in the orchards the skill and expense that the Western grower does, we have the market at our door which will take up firsts, seconds and everything. I have solved this problem by building a cold storage house in which the apples are stored as soon as gathered, all the winter apples being put in there without sorting, and, by the way if you thin the apples there will not be much sorting to do and if carefully handled very few bruised ones. I think it was Mr. Tyson who spoke of the value of color. The apple that should be red and is not red is of no value to me. We are 15 miles from Toledo so that we supply the leading grocers there on orders. They phone in their orders twice a week for 20 to 40 baskets and they are freshed packed and covered with netting; and especially in that case we find that an apple without color not only has no flavor but has no appearance. In many instances I leave the apples hang on the trees, not picking them too early. Possibly in some instances they keep better in common storage if picked early but not in cold storage. An apple should be allowed to hang on until it ripens and colors up, and if sprayed thoroughly you will not have so many rotten, and if free from worms you will not have many to drop.

In regard to the discussion on fillers that was brought out—this is a kind of scattering talk—we have found the Rome Beauty one of our best fillers. The Wagener is good but with us the Rome Beauty is a better apple and sells better, while the quality is not equal to Wagener; and I have been using this method of using Rome Beauty and Jonathan. I had 25 to 30 dwarf apples I set out 18 years ago and they did not bear any more than the standard trees. We have

now only 12 or 15 left, and judging from my experience I would not use the dwarf apple. I have no use for the peach as a filler, for the simple reason it would be difficult to spray the one without interfering with the other. I know some do it. My plan is this: I plant my permanent trees 40 feet apart each way and right in the center of the square I put another of the permanent varieties. That means just as many more of the permanent trees. Then I put in between the fillers until I have my trees 20 feet apart each way. That requires a little care in the selection of varieties and in management and pruning. It would not be wise to plant Baldwins or any of those slow growing varieties 20 feet apart because before they bore you would have to chop down part of them. I can take any young orchard and by the wrong kind of pruning and wrong time of pruning I can keep that orchard from bearing fruit for five years longer than its normal period. Cutting off too many of these lateral branches and pruning too vigorously will check bearing and promote wood growth. I would not go to the other extreme of not doing any pruning at all. If I do prune I take pains in shaping my young apple tree. We don't do much pruning for a few years. You are not going to get such an excessive growth as to require a great deal of pruning after you have got them bearing. The peach is a tree that requires continuous pruning and a good deal of it; but in the case of the apple, pear, plum and cherry we try to do just as little as possible. They say sour cherries don't need any pruning. You know sour cherries will throw out a multitude of fine branches that cross in the centre of the tree. These intercrossing limbs must be kept cut out.

I believe that most of us will find it advisable to grow as nearly as possible a succession of fruits covering the entire season, fruits of good quality. We have a wonderful advantage over our Western competitors in having the markets at our doors, and while they grow fruit that will not bear transportation we can let the fruit ripen on the tree, handle it with care, grade it carefully and meet them every time. If you have No. 2, mark them No. 2. Grade them carefully and put your mark on them. Every package of our fruit bears a pink slip with our name and device, a four leaf clover, and that stands back of it as a guarantee. We thought it did not amount to much until last fall. We ran out of slips and we sent out peaches without them and the next day we got notice from one of our dealers that they did not want us to send any more without the pink slips. He lost a sale because a lady thought he was trying to bunco her. We have pride in our name and reputation and if you put your name on it and build up a reputation it is not a question of getting the money for your goods. It is simply a question of getting enough good quality fruit to supply the demand.

A Member: I set out several hundred peach trees this spring and cut them down to three feet from the ground and some of them are starting nicely near the top, but a great many are starting six to eight inches from the ground and a great many little shoots around the tree. Is it advisable to rub these all off and get started from above or better start from below?

MR. FARNSWORTH: I would let the ones start from below; let about three branches start from below and when they get up three

feet from the ground pinch the ends off and make each one of these branches form two more. A great many peach trees started will do that, I have noticed, and we probably shall let all the branches grow from the ground. It will make growth enough. Next spring we will select three of these opposite to each other and about two and a half feet from the ground and we will leave two or three side branches on each one of these.

A Member: In regard to the soy beans you sow in the orchard, do you intend to plow them under or take off for hay or turn the pigs in?

MR. FARNSWORTH: If that orchard was fenced and I had the pigs to turn in I would do it because it would not take much fertility out of the orchard. Most would remain there, and you would get the benefit of the pork. I shall just let it go down to the ground; probably sow vetch on it, sand vetch, as it is away from home. Last year I cut some off for hay and fed to the steers; but ordinarily we simply grow it as a fertilizer.

A Member: How much seed do you sow?

MR. FARNSWORTH: About three pecks or a little more per acre. You know in drilling it in that way it does not require so much. Sometimes we sow acid phosphate with it in the drill. Acid phosphate seems to give better results on our soil; but we use it mostly in connection with the stable manure and we spread it around through the pens and over the yards to reinforce the manure and supply that element that is lacking in the soil and manure.

A Member: The reason I asked if by leaving it on it will make a great deal of wood growth by leaving. I take mine off and feed to the stock.

MR. FARNSWORTH: I have never been frightened of getting too much wood growth. You get it in the early part of the season. We have an apple tree that stands near the tenant house where it gets an excess of hen manure and it makes a great growth and the largest amount of fruit in the block but the apples did not color exceedingly well. The tree grew and we got fruit but it never got a real good color. It had an excess of nitrogen. I am trying an experiment on it with phosphoric acid and ashes thinking possibly by balancing up the food I can counteract the effects of the nitrogen I understand with the nitrogen we will get a larger amount of foliage and that to a certain extent will retard the coloring of the fruit; but I never had any injury by excessive wood growth, although it is possible to get it too late in the season. I manage to get it early in the season and give it a chance to ripen up. That is the advantage of cultivation in the forepart of the season and no cultivation and cover crop later, stopping the cultivation, it takes up part of the moisture for the cover crop and checks the growth of the trees and ripens up the wood. The cover crop adds humus to the soil and increases the moisture holding capacity of the soil as well as fertility.

A Member: In starting an orchard, what method of pruning the roots do you practice?

MR. FARNSWORTH: Why, if we have three or four roots seven or eight inches long, we cut off the broken and bruised parts and we cut the fibrous roots off. In the case of the peach we leave a single stem; but the other trees we leave three branches, never more, six or eight inches long.

A Member: What is your object in trimming the fine roots off?

MR. FARNSWORTH: They are not much value at the start. They are the feeding roots of last year. I can plant better and get the earth closer. You will not get the earth so solid around the roots if they are left.

A Member: How do you break up the soil in the orchard where you have currants?

MR. FARNSWORTH: We have generally been using a one-horse plow but never liked it and this year I put in the one-horse cutaway harrow. You can work up the ground thoroughly and then afterwards with the one-horse spring tooth cultivator.

A Member: How far apart do you set them?

MR. FARNSWORTH: This one plantation we planted ten feet apart. I like to plant seven and one-half or eight feet. We have to have room to spray. If I was limited for space I might put them seven feet. The Wilder and several other varieties ought to have eight feet between the rows. It gives plenty of room for spraying and the pickers to get through. We use the cutaways largely in our orchard.

A Member: How much arsenate of lead and commercial lime-sulphur do you use in spraying?

MR. FARNSWORTH: We put ten pounds of arsenate of lead in a 250 gallon tank. A little less might answer. A pound to 25 gallons. That is enough if you have a good article.

In spraying for codling moth we put on more material, spraying material than for other purposes so as to cover the tree thoroughly and are particular to have a good pressure. We are using 150 pounds and we have gotten splendid results.

A Member: What length of new wood would you consider a normal growth for a young apple tree the first year?

MR. FARNSWORTH: That is a pretty hard question. It depends much on the soil, the variety and time of planting. Anywhere from one to two feet would be a good growth the first year. It depends so much on time, the condition of the trees, condition of the soil, rainfall, etc.

A Member: How long after the blossoms have fallen can you spray safely for codling moth?

MR. FARNSWORTH: I don't know just how close you can come to preventing it after two or three days after the calyx closes. You want to get over them as quickly as you can. Prof. Gossard, of Wooster, in one or two outside orchards where he was delayed a little did not finish for about ten days or more and got splendid results. I do not want to throw that out as an inducement. You are getting close to the precipice. I would try to do it before that.

A Member: If the rain prevented you?

MR. FARNSWORTH: I would spray as soon as I could. We are having a little trouble just now. We are having a hot wind from the southwest for the past ten days. We have only got sprayed one way. I am going to stick to it and give the other spraying if we cannot spray for two weeks. We cannot get a satisfactory spraying against the wind. By having a good force of outfits we can spray both sides with the wind usually.

A Member: What about keeping sheep in an orchard and letting them keep down the brush and weeds where it is on a steep hillside and not practical to cultivate?

MR. FARNSWORTH: I have seen some orchards, one of a friend of mine who keeps many sheep in there and they are well fed and he does have fine fruit. Mr. Woodward, over in Lockport, N. Y., advocate that idea. He does it in this way. He stocks them with good sheep and then feeds them heavily, so that he is carrying plant food into the orchard and adding fertility. There is this objection: You must have high headed trees and this is a disadvantage in the way of pruning and spraying and getting the fruit. If the whole orchard is high headed and on a side hill it is a good way, and feed grain to the sheep. The balance that you feed the sheep will be left on the orchard. If the orchard is headed so high that it will not be hurt it is a good way to manage. That will not take the place of spraying but it will help. I would not put any in my orchard.

A Member: Would you advise sowing alfalfa to pasture your hogs?

MR. FARNSWORTH: That is an experiment I would like to see tried but want the other fellow to try it. I know a man that claims that alfalfa is a good crop for the orchard. I am not so sure about it. I am skeptical when it comes to that. Hogs are all right in the orchard sometimes but will bear close watching. I would rather keep them separate. It might do to let them in occasionally. Alfalfa might be all right. We must try it first and I have not tried it.

DEPUTY SECRETARY MARTIN: Before closing this session, we desire to make the announcement for this afternoon, calling your attention to the program. The session will be presided over by Mr. George F. Barnes, of York county. As you will notice, this session is devoted to general discussion for the development of questions relating to the institute work throughout the State. Now to the Institute Chairmen, the County Chairmen, the Institute Lecturers and to all

others we say to you this is your session. I hope to give a very brief synopsis of the work completed during the past year. This meeting will be thrown open for the development of this great work throughout Pennsylvania. The session will convene at 1.30 o'clock this afternoon.

The CHAIRMAN: Is there any other announcements?

MR. J. ALDUS HERR: On Friday, after we adjourn, the local committee has made some arrangements to show the visiting delegates our town. There has been a trolley car engaged that will hold 50 to 60 people and we will meet in the square at the monument at ten o'clock. It will take probably an hour and a half to go the round. Part of the route will go by James Buchanan's home, Stevens Industrial School and other places of interest in the city. We will be glad to have the delegates with us.

DEPUTY SECRETARY MARTIN: Another thing that has been overlooked, that is the appointment of a Resolution Committee. Usually at our meeting there are some resolutions that it is important to take action upon. Year by year one and another of our number are called away from these scenes and, of course, we always express in form of resolution on these things. We will appoint on this committee Messrs. Dorsett, of Tioga; Lighty, of Adams; J. Aldus Herr, Lancaster; Schultz, of Montgomery, and Biddle, of Bedford. Persons having resolutions that they desire to have presented will go before that committee any time and place where they may appoint for their meeting.

MR. JOEL A. HERR: I have been informed that Mr. Dorsett has gone away.

MR. SCHULTZ: I am sorry that I too must go away.

DEPUTY SECRETARY MARTIN: We will appoint as substitute for Mr. Dorsett, Mr. Joel A. Herr, and as substitute for Mr. Schultz we will appoint Mr. Taylor, of Washington.

We will now adjourn until 1.30 o'clock this afternoon.

Wednesday Afternoon, May 24, 1911, 1.30 o'clock.

Mr. G. F. Barnes in the Chair.

The CHAIRMAN: The hour has arrived for the opening of one of the most important sessions of this Normal Institute, and inasmuch as the time for this session is always too short I trust that those speaking on the different subjects relative to the management of Farmers' Institutes will condense their thought to the subject and will talk along that line in as brief a manner as possible in order to give each and every County Chairman as well as each of the Lecturers an op-

portunity to offer any suggestions which may be helpful in bringing about more successful institutes in the future than we have had in the past. I appreciate the fact that Pennsylvania Farmers' Institutes are among the best held anywhere in the United States, yet there is always room for improvement and for that purpose this meeting is held. I trust that we may all get some assistance in this direction at this session. Hon. A. L. Martin, Director of Institutes will now open the discussion.

DEPUTY SECRETARY MARTIN: Mr. Chairman, Friends and Fellow Workers: You must not think when I hold up this manuscript that I am going to read it all to you. We have here in a condensed and tabulated form the attendance at all the institutes that were held last winter in Pennsylvania; not only the attendance, but the number of State Lecturers who attended these meetings, the number of local people who addressed these institutes, the number of sessions that were held, where they were held in the different counties and the attendance by session by two and one day institutes, and the attendance by counties, the final summing up of the attendance in the entire State; hence I have brought this tabulated manuscript with me in case questions might arise relative to the work in the different counties that we could not have this manuscript for reference in that event. I might say that last year's work with the institutes has marked what we might call the highwater mark. The attendance was greater than ever before. The interest manifested, so far as reports have come to me, was never so intense as last year. Indeed, farmers and other citizens, men in business vocations and in other callings have manifested an interest in the development of agriculture not heretofore known or heard of and the requests we receive at the office for additional institutes and movable schools are such as shows to me and to you the work is on the increase everywhere. You might be interested to know something of the attendance in some of the counties in Pennsylvania. The attendance ranges from 1,000 to 14,685. The county this year having the largest attendance is the county in which we are now holding this Normal Meeting, the County of Lancaster. No word of mine could in any manner do justice or credit to the standing of this great county amongst the farming communities of the world. It stands out as the one county showing an example of thrift and prosperity and agricultural advancement excelled by no county in the history of the world, and hence we are proud to hold our Annual Meeting amongst farmers of such great excellence and advancement. Lancaster county had 14,685 people in attendance; at all their sessions. Then the next county is York, with 11,715; then the County of Tioga, 7,180; Schuylkill, 4,785; of Montgomery, 5,560; Indiana, 4,485; Dauphin, 4,790; Chester, 5,265; and the County of Bradford, 4,225; and of Berks, 4,083. The counties that I have enumerated are those having the largest attendance. Now when I say the largest attendance I don't want to be understood as saying that they gave the largest attendance in proportion to their number of farms or population. You know that there are some counties in Pennsylvania with a population of but a very few thousand that have given an attendance practically equal to the number of farms; that is, proportionately equal to the others, and in some cases excelling, in proportion to the

number of farms in that county, by considerable. Thus you see we are only enumerating this great attendance as phenomenal, but if we were to analyze this attendance we would possibly develop the fact that in some of those counties which have only two and three day sessions the attendance in proportion to the population would be greater than Lancaster county.

You are possibly interested in some of the subdivisions of the work, and hence we have some data here that ought to be of interest to you. These meetings have been divided into some four subdivisions. We have what is known as the Special Institute. These Special Institutes have grown up within the last two or three years, in which the farmers' organizations, the farmers' unions, farmers' clubs, local granges, in different parts of the State are exceedingly anxious to procure instructors along a certain line of farm operations. A correspondence is developed with the Department through which we send to these various localities one or two instructors, joining with the locality in the development of this work, and hence we call these meetings Special Institutes, joining with the local people both in the development of their community and their institutes in this direction. Now there were in attendance at these Special Institutes last year 10,376. At the Regular Institutes, the institutes that have been scheduled regularly in our bulletin, the attendance was 162,809. Then we have still another division of this work that is rapidly developing in Pennsylvania, and of no mean importance, I refer to Harvest Home Picnics. You know one of the grandest things and probably one of the best organizations that we have in Pennsylvania for developing the social side of farm life are these Harvest Home Picnics. There the farmer and his wife, sons and daughters, the young and the old people of the territory, coming from miles and miles, assemble together out in some beautiful grove, and in lieu of spending that time in amusements that would be worthless and unprofitable they have invited the Department to join with them and send lecturers in order to devote at least two hours of the day to the development of the great work upon their farms, and we join with them in that work and so far as means and speakers are available we have afforded the same, and at these Harvest Home meetings last year our speakers addressed over 20,000 people. There is also another division of the Farmers' Institute work that I will refer to and that is what is known as our Movable Institute Schools. These Movable Schools were held last year in the following counties: Potter, Warren, York, Lackawanna, Columbia, Venango, Erie, Crawford, Westmoreland, Chester and Lehigh. I stop for a moment for a word in reference to these Movable Schools. No one of these schools was held at the last season occupying less time than four days. In the County of Columbia, where there were two of these schools held, there were eight days of Movable Institute Schools. These meetings differ from the ordinary Farmers' Institutes in that they take time to deliberate and develop a certain line of subjects. Thus far we have taken up for the past two years three distinct branches of operations carried on by the farmers of Pennsylvania, namely, and possibly of first importance, the dairy interest. You know the importance of this is a vast interest in Pennsylvania, and do you know, my fellow farmers, to increase that nearly a million of dairy cows in Pennsylvania it would possibly be a financial advantage to the owners of the same if one-third of these cows were to-day turned off

to the butcher and the balance stabled, fed and cared for as the most approved methods of the day in which we live would teach. In these schools there is demonstration means of instruction. The Babcock test in learning of the butter fat contents, for instance; and in most of the places certain members of the class take hold of this work and learn quite readily how to handle that little implement that tells so much as to the profit or loss the dairyman is receiving from each of his cows if he will only follow its direction. Indeed, in many of these cases not only is the Babcock test used but the churn was actually brought into these meetings and the butter churned and they figured out the contents as to butter making in the lessons given. You listened yesterday to the excellent instruction given by one of our lady butter makers in Pennsylvania, developed along exactly the same line; and hence the importance of this cannot be made too emphatic. The profit to be attained from the dairy interests of the State to-day, my fellow workers, depends upon the manner in which each and every cow is handled and our efforts is to develop greater profit from them.

Now again the other two lines taken up in this school work are poultry and horticulture. Horticulture requires a line of cultivation to develop the growth of the tree and fruit from the soil of Pennsylvania and by reason of its peculiar conditions is indeed tending to develop probably the highest type of manhood, and hence we employ the best experts that we can procure to develop lessons in the various and most important lines in selection of the trees the selection of the plot for the orchard, the planting, cultivation, harvesting of the fruits and the marketing of the same.

And then again the last of the three lessons developed at these movable schools is that of poultry. We are just beginning to realize, my friends, the possibilities, the reasonable business possibilities and profits that can be attained in poultry lines. Indeed, the best figures that I can procure from Pennsylvania for last year are that from the sale of eggs alone in the State of Pennsylvania over \$20,000,000 were procured. That says nothing about the value of the poultry, the value of the poultry buildings and the money invested in all these things, I am guaranteed in saying that there has not been developed a greater profit for the money invested in poultry in either the cow or the orchard. So we are developing along in these movable schools, teaching the most approved methods in the modified class form. They seem to be rapidly taking fast hold on the farmers of Pennsylvania. I have many requests for movable schools in several of the counties where they have not yet been held and most of the counties that has had schools within the last two years are to-day asking for same the coming season.

I should say here, lest I forget, that counties desiring the movable school (this is for the County Chairmen) when they make their report requesting and naming the places where the regular institute is to be held, should in that same circular, make the request for a school at the same time, and naming the place, I can assure you in just so far as the means at our disposal are available the counties asking for these schools will get them, providing the conditions under which they are attained are observed. One of the conditions is that we would not send a movable school anywhere in Pennsylvania unless twenty men or women sign a paper agreeing to attend all the sessions of that

school. Now I believe that is right. We are not searching for some place where 5,000 or 6,000 people will attend. That is very encouraging indeed. In fact there are many of these schools where the attendance has been so great that we had to cast aside the question of class observation entirely and develop in more general manner the work. But a class of 20 in any given locality in Pennsylvania, young men or old men and women, who will come there with a full determination to arrive at a proper conclusion on the matters of the development of the interest in which they are engaged, are a sufficient number to guarantee a school, and we believe if we can get 20 men and women in a locality so earnest that they will come for three or four days in the week to take in and absorb the lessons developed there, the object lessons standing out in that community practically are to have better agriculture.

Now, my friends, I believe the program said that I would open this discussion. I think I have occupied my full time.

DR. CONARD: Do you have the attendance at the schools?

DEPUTY SECRETARY MARTIN: I forgot that. May I read it now. At these movable schools last year there was an attendance of 16,198.

Now let us sum up a little and see just what our attendance was. Total attendance, Special Institutes, Movable Schools, Regular Institutes, Harvest Home Meetings, 209, 383 people attending last year. The days of Regular Institutes scheduled in our Bulletin were 395 days; the days of Special Institutes, 24; days of Movable Schools, 58. We had \$18,000 to expend on lecturers and hall rent at Regular and Special Institutes, of which we held 477 days. You know it costs something for these things. We have looked over the records of many of the states, and I challenge any state to show us a record that will excel ours, when all things are considered, for economy of work. These institutes include hall rent, everything connected with the work in the different localities, including the expenses and per diem pay of all instructors, and everything is \$35.00 per day all considered. Many of the states are not higher than \$50.00 and when we come to consider the character of the instructors and the character of the instruction, have reason to feel proud of the record of 1910-11.

In addition to this we hold annually our Normal Institute, the same meeting as we have it here. Meetings of this character cost us a little less than \$3,000 all told. There are other expenses connected with this work, such as local postage and work of that kind, about \$500. So that for the \$22,500 that we have had to expend this last year we have accomplished such splendid results.

Now, my friends, we have devoted this afternoon session to the development of the great work. Here before me are the County Chairmen of Institutes and I want to say a word about that, gentlemen. I can think of no number of men anywhere that for the past twelve years have accomplished more disinterested, generous work than those men, without pay. An impression sometimes goes abroad over Pennsylvania that these fellows that have charge of institutes in the counties somehow or other get a pull. I want to say to you men now, you were invited to Harrisburg two or three days ago and the strength of

your argument before that Appropriation Committee was such that I could say to them that here is a body of men that for the past 12 years have devoted about a month of their lives each year to the advancement of agricultural interests without a cent of pay. That closed the mouths of all parties for it is the truth, and the plain unvarnished truth, and they listened to you and they heard your arguments.

I want to say something more. The strength of these Farmers' Institutes in Pennsylvania is just disinterested work of such broad-minded men, who have been willing to do it because of the interest they have had in it for the last 26 years. I hope the time will come, and it will come and you men will show forth your strength in Pennsylvania to get what is rightly coming to you, that you should be worthy of your hire in this matter.

And now just a word to these other gentlemen and ladies. One of the things that we hope to develop in the future to a greater extent than has already been developed is that of women's work at these institutes. I am proud to say that we have in Pennsylvania in this institute work a corps of lady workers efficient and faithful to all the trusts wherein they have been trusted. They have gone forth over Pennsylvania through storm, cold, sunshine and cloud, teaching and meeting with the people, with the women and with the ladies, developing the questions of household economics, sanitation, education and teaching the development of home life; of all which I am very proud, and hope the day will soon come when we can go to the law making power,—and demand something practical, equal that given to the regular farmers institutes, for the development of women's work on the farm and in the home. It is coming. Now the men workers, we have a corps of over 70 instructors in Pennsylvania. The State College and Experiment Station has, so far as the duties of their strenuous work would permit, sent out their very best instructors to join with us in this great work, and I express here and now my hearty thanks to that great institution that is doing so much for agriculture in Pennsylvania and for the work they are accomplishing with us in this State. And the other men who are engaged outside of them are men almost universally who have by actual practice upon their farms and by their research connected with that developed full success in certain lines of agriculture; men of mature judgment and deliberation, sent forth in Pennsylvania to develop with the farmers of this State the highest order and conditions of agriculture. If there is any one thing I have reason to be more proud of than another it is that the Pennsylvania Farmers' Institutes have an organization of men in every county who are actually engaged in farming with their sleeves rolled up, and that we have a corps of instructors of ripe experience and actual practice upon the farms of Pennsylvania, and men of deep scientific research in agriculture, chemistry and botany as applied to agriculture. Thus we hope and expect that as the years pass on greater development, more thorough instruction in all of its lines will be developed.

Now, my friends, I shall not talk any more. It is your time to talk, to develop any questions that may come before you. I thank you for your attention.

The CHAIRMAN: Mr. Martin has given you a good line on the work of the Institute Division and what has been done. Now you have an opportunity for the discussion of these different subjects and bringing matters before this meeting, and I will ask the speakers when they get up to speak to say, I am Mr. Edwards, of Adams county, or whoever they are and wherever from, and in that way we will get a correct record of the speakers and their thoughts. We are now ready to hear from you.

MR. STOUT: I don't want to force myself upon the audience as the first speaker or one who has superior knowledge, but while I sat here this forenoon I thought out a few lines that I noted down on this paper and now whether I will be able to read them or not remains to be seen. But listening to these discussions, some things have suggested themselves that I noted down. While it seems like thrashing over old straw it is likely there is some grain left in the chaff.

Continuing of the same opinion that I entertained and expressed at previous meetings, it may be profitable to repeat that the theory that the farmers in general have been neglecting the elementary in agriculture is not well founded. There is too much catering to the class of agriculturists who have great estates and incomes to devote to ornamentation and display. To present glowing pictures of mansions, lawns, poultry plants, model farm buildings, costing hundreds of thousands, is neither edifying or instructive to the average farmer who must depend upon his own efforts with no other resources than that taken out of the soil by his hands and his family's. The beautiful pictures presented by Dr. Hunt of the Alpine scenes, the towering mountains and glaciers presented to our view, we might desire to mount the high pinnacles of those glaciers, but we cannot. They are like the glowing pictures and discussions of some of our institute lecturers whose practical experiences consists of a view from a distance. Our schools are classified so as to reach all ages and conditions and it may be advisable to obtain two kinds of instructors; one group to instruct agriculturists and another to visit rural districts, cross road villages and isolated sections where primitive conditions prevail. In order to overcome some of the inconveniences encountered in this work it may be advisable for the Department to furnish conveyances on the order of the old Conestoga wagons or prairie schooners, supplied with some beds, blankets and robes and such conveniences as may suggest themselves while on the itinerary going from one place to another, and thus avoid the theoretical work of farmers' institutes. There has been complaint about institute speakers compounding the situation where large audiences had assembled at night to hear the discussions, and because the accommodations were limited and not equal to those furnished in the cities at \$3.00 a day houses the lecturers went away without carrying out the program. These are a few of the views I entertain and if the Department can use any of these suggestions to improve the agricultural instruction of rural communities they are welcome to them.

MR. KAHLER: Mr. Chairman, our worthy Director has given us a lot of statistics showing the development and improvement in institute work. It is easy to make assertions. Now I think it is our business to give our ideas whether the institute is improving or retrograding. I have had the honor and misfortune of being an institute mana-

ger for twelve to fifteen years, and I am not saying this to the detriment of the men who were doing it before that. The point I want to make is, are we going uphill or downhill. I think it would be a good thing for all of us men to show that up. There is an Act of Assembly that says we shall publish when we shall have a meeting in our respective counties to receive applications for holding institutes. I supposed when I was first elected that I would meet a lot of fellows there and I met myself there a great many times and nobody else; nobody there at all. Now in the last two or three years if I don't go to the Court House at all to hear the applications I would have about three times as many as I could accept, by letter; and for the last two or three years in our county they don't only wait for that but they send a delegation to press, "give us an institute now." I can see it in what little time I have devoted in other counties, comparing it with twelve years ago when you would see a lot of fellows, four or five retired farmers probably come to the meeting, flat headed fellows that had left the farm. The men that we wanted to reach were not there, as a rule. At night we would have a full house, have to get a big house to accommodate them. Most of them came there—it is a place to go to see your best girl and all that sort of thing—but if it was not funny it would not amount to anything. Half the people have no idea in the first place of the institute work, what it was like or its purpose. I often think about it. I was sent to a certain portion of this State to an institute at one time and, to use the farmer's phrase, I was off in my feed. I played my part of it and went back to the hotel. It was a fairly good community, too. I sat down there and after awhile a gentlemen in the office, a commercial traveler, said to another gentlemen of the same kind who had just come in: "Well, James, where have you been?" "Oh, I was down here to a meeting. I have been traveling over this country and every once in a while I see a great deal about the farmers' meeting, a great outpouring of farmers. I had no idea what a farmers' institute would be, so I had a little leisure and I thought I would drop in and see what was doing at the farmers' meeting." "Well, what is it like?" "Very poor meeting," he says. "I got in there," he says, "and there was a big six foot huckster talking to a lot of people about feeding calves. Don't that beat you?" he said. I think some of our men have as poor an idea of what the purpose of our institute is as he had. But I don't want to take up your time, but I want to say that a great deal is in our hands to advertise. We have a blue print of what is to do and it depends a good deal upon the men to work that out. It is not doing what some of us would like to see it do. I had a conversation once with a friend of mine, a minister. He says, "I have been paying a great deal of attention to farmers' institute work. Is it doing any good?" "Well, I hope it is; probably not as much as we would like but we are not discouraged in the matter." He said, "I cannot see that it has accomplished anything." I said, "I would like to ask you a question." I said, "You are a minister of the gospel. Do you convert all the people you talk to?" "No." "Do you get discouraged and give up the business then? Don't you put on more stress every evening to impress your people to do what they already know than to give them any other information?" If you can make an impression in any community along your line of work on two or three men who have a good influence it will spread and you will soon see a widespread interest and I hope it will go on.

MR. SHUEY: I have a point that I would ask the Department to look after for the coming year; that is the clover question. Now we all know that we are lacking in growing clover as we used to twenty years ago and I have asked some of the lecturers that have been to my county on that very point and they would not give me the answer I wanted. They claimed that clover froze out. But it don't. There is something the matter with the clover, something working with the roots and it is dying off in the fields. I would like if the Department would get someone at work to examine that and in the next winter's lectures to have some competent persons to explain that and whether it could be prevented or not. That is one of our important points that we need in Pennsylvania, to keep clover more than one year.

And as the advancement that is made in the institutes in the counties, I must say for our small county that since these farmers' institutes are started—I guess I was one of the first that attended institute in our county. I know we held institute with six persons present when we started in first. Now it is sometimes difficult to get a hall large enough, especially in the evening, to hold the people all. And there is a great advancement made in every part of the agricultural lines in Lebanon county and especially in the fruit lines. We have some few persons that took hold of it that I don't think can be beat in the State of Pennsylvania. They bring the best quality of fruit and make it their business to study up and have the scientific fruit put in the market.

MR. STOUT: I want to answer the question that he brings up in regard to this clover. We had that discussion up at our institute last winter. There is a little insect called the clover root borer. I gathered some and exhibited them up in Blair county and I found them at home earlier in the season. About this time they have escaped and are laying their fresh brood on the young clover now growing and they practically destroy the clover crop that has stood for one year, and it is a question whether it is a benefit to have it destroyed, because I think it is better to have it plowed down for the coming year.

MR. J. ALDUS HERR: I have a few suggestions for our county. While our institutes have grown and are growing rapidly, yet the needs of our county I think are different from those of most of the counties in the State. What we would like to have would be persons who come here as speakers to be practical men, men who are practical cattle feeders. That is one of the main objects. We as a county feed cattle, what we call stockers, ready for the block. We want practical tobacco men. We have some but we need more. And we want more good men who are practical corn growers. These are essentials which right in our county confront all of us as farmers, and unless the men or speakers can appear before the audience and give their practical experiences and results I am afraid their labors will be futile here, with all due respect to the men whom you have sent here. We have made advances and if you go out over our fields you will find we are trying to improve as fast as we can, but we want practical men.

Another thing that is growing here within the last four years when we had our first exhibits at our institutes. Last winter we had over 1,250 exhibits. At one of the meetings we had to hire an adjoining

hall to put the poultry exhibits in. We had a great exhibition. Now, if you can, would it not be possible to send us speakers that are versed in these different lines, who can score the different exhibits according to their merits and, if you please, have the person who grew them or exhibited them explain to the audience how they were procured. We can get the people, and there is not any doubt with a little push and with my assistance and Mr. Hibshman's we can make the institutes of Lancaster county a miniature winter fair, with the speakers coming here capable of awarding the merits of the different exhibits that we bring here. I don't doubt it in the least that we can get the different halls we have for our audiences two-thirds filled with exhibits. There is nothing so instructive or that inspires a person so much as to see the living object right before him. (Applause).

MR. PEACHEY: Mr. Chairman, what I am going to say I think will be more directly in favor of the farmers' institute lecturers' business than what it will be with reference to the work that is to be done at the institutes. I don't want my portico to get bigger than my house. For that reason I want to tell you that the thing I am interested in is getting rid of that Saturday evening institute session, and I know that some of them will shake their heads. It don't make any difference. I have seen them shake their heads before, but I know this and I am going to talk it from the standpoint of the institute lecturer that has been on the road all winter and not several weeks during the winter, and I am going to tell you that it grows mighty monotonous to work six days in the week and do your work and take it as it comes, which sometimes is pretty rough and was even last winter in one or two districts of a certain section of the State where you were required then to sleep in a place where you should not sleep and on Sunday morning take the train and travel thirty or thirty-five miles and stop at another hotel and then in the afternoon, towards evening start again and get to a place a little late at night and next morning get up for the 6.30 trolley and travel along to a station and then ride eight miles out in the cold to get to the institute on Monday morning. I am going to say right here that it is an imposition upon the members of the institute force and you may as well use plain terms because I want to be understood. I tell you that reminds me of a young man and lady that were going together and she had been somewhat tanned and sunburned and she said the hide on her hands and face were not just what she would like. The young man said she should not say hide; she should say skin. He said that is more proper. Then they went to church. The hymn was announced, "Hide me, Oh, My Saviour, Hide me;" and the young lady began to sing "Skin me, Oh my Saviour skin me." And so I want to say just this that when you are subjected to such things as that it comes near to "skin me, oh my Saviour skin me," working in the institute work that way and I would rather "hide me, oh my Saviour hide me," in a hotel over Sunday than do that kind of work. Now then you understand my position. Some of them come up and tell me, "we have got to have that Saturday evening session in order to make up our numbers." Why these numbers on Saturday evening might be all farm people or they might be all people that came to be entertained, and I know that I have tried to entertain them. And so I am interested in that from the fact that it

saps the vitality out of the farmers' institute lecturer to work six days in the week and then travel on the seventh, and I want to know why we cannot use all the commandments just as well as a few of them. I believe that six days belongs to us as farmers institute lecturers, but I don't believe that we ought to work the seventh, and last night Dr. Bailey in his talk here spoke about the religion of the men on the farm, and I think we ought to take care of that on Sunday; and I am going to say right here as I said before, that it is not doing justice to the farmers' institute lecturer to require him to travel then. If you are going to have that Saturday evening session have it at the place where the institute lecturers can get in a hotel on Saturday night and have what he ought to have, and that is good accommodations over Sunday; and I am going to tell you this, that I have a lot of sympathy for that farmers' institute lecturer that is running away from these meetings on Saturday night in order to get to a good hotel on Sunday, from the fact that I believe that it belongs to him. Sometimes, I am going to say this; that as I look at the county, we commence at the wrong end, and I have traveled as much as eighteen to twenty miles after Saturday night's session to get to a place on Sunday, and I know others have done it. Now I don't know the sentiment of the institute lecturers but I know the sentiment of some of them. I don't know the sentiment of the farmers' institute managers with reference to this, but I know that of some of them, and I know that some of them have been very careful along this line and have endeavored also to arrange these affairs so that following a Saturday night meeting we were at a place where we could stop. Another story: You know a man was sick and he was very sick and just suddenly he became a little bit better. He did not know where he was. He woke up and said to his wife: "Oh, I feel so good. Am I in heaven?" "Oh no; I am with you yet; I am still with you;" she said. Well now, if we cannot get to that heaven of a good hotel on Saturday night to remain on Sunday, why please don't have the other end just as bad as it has been made for us sometimes.

Another thing I want to say: Last winter some of my mail went wrong. The folks at home did not know where I was and I know some of them cared. I knew where they were and I could write to them. We have that rural mail all over the country and it is a good thing all right. But if they don't know where to write to because sometimes the places of holding farmers' institutes have been changed to what the bulletin says and these things want to be right. I tell you it is a hard life to be hauled over the country under such conditions and I don't want to do work under such conditions and more than that, I am not going to very long; and so far as that Saturday night is concerned I am going to tell you here, county chairmen, I want you to do your best and if you have done your best I am going to do all I can possible for the institute work and there is no man here dare say I ever shirked my duty along the line of institute work or ran away from institute work when I was needed, and I am working for the best interest of that farmers' institute work; but if you are going to hold me out late on Saturday night, away from civilization and good hotels, you are going to be badly disappointed about four or five o'clock if there is a livery team anywhere near to get me out, because I am going to get those hotel accommodations and look

after the business because Sunday is mine. It belongs to me and if you want to hold me and have me to work on Sunday I want you to pay me, and when you pay me I want double pay just as they do in many other instances where they require a man to work on Sunday. I hope I have made myself understood. (Applause).

MR. BOND: I just want to say that I have never been affected with fear of accommodations or sickness. If I was I would carry my medicine chest along or quit the business.

MR. WOODWARD: I have a very warm and sincere sympathy with the criticism that Mr. Peachey has made. I believe he is absolutely right. It has been a long time since I have been on the institute roster. I concluded that the audiences of Pennsylvania had enough of me and I dropped out. Since then I have not given it attention except in my own county and I appreciate very much what he said. I had the same experience when I was in the work and I appreciate it so much that in my annual conventions I take pains to avoid the conditions that he objects to in my own county. There are two methods by which it can be avoided. I have practiced them both at some places and at other times separately. The speakers need relief. It is a hard burden upon their physical constitution, six days and six nights in the work and they do work six nights, and the average institute workers, the better ones of them at least, make an average of fourteen or fifteen speeches a week. They are worn and weary and they need comfortable places where they can get a bath and hot and cold water and a warm room to sleep and retire, a warm room to write home and bring up reports. I do not criticize the Department for making the program out, but sometimes I think it would have been better if it could have been placed otherwise, but I am not acquainted with the conditions that the Department has to contend with. I may name the places four our own county and the Department takes up sixty-seven counties divided into sections and in establishing the itinerary for each section has to make an economic use of the funds as can be and I have no criticisms of that. But when I find that the speakers are to be in my county in places that are out of the way and where inconvenient or impractical for them to spend the Sabbath, where there are no good hotel accommodations—you may say yes but there are farmers will take them in and treat them to the best they have and as one of family, but he is not at home, not at liberty. He wants to go to the best hotel where he can write and rest and be comfortable. I know from a long experience. I provide for it by arranging to have three sessions on Friday and two on Saturday, eliminating the Saturday night meeting entirely in order to give them a chance to get away if I can or if necessary, I arrange that the State speakers be relieved from the Saturday night meeting and that the local speakers take up the work. One of them may be compelled to remain, but I take every means in my power to relieve them of what I know from personal experience of long years absolutely unfits them to do justice to institute work. It is hard work and no man can be expected to work six days and travel the seventh and be fit to go in for another week. And I say, without reference to the Department, that it lies in the hands of the county institute managers to relieve them to a large degree. I have not succeeded in doing

away with the Saturday night session entirely in my county but I have succeeded in relieving them in that way in my county so that there is no complaints at all.

DEPUTY SECRETARY MARTIN: Just for a moment. I have learned that a gentleman very largely interested in good roads is present and can only be here for a few moment, Dr. McCaskey. The audience will listen to him for the few moments in reference to some things he has to say on this subject. You know we just passed a resolution this forenoon and unanimously referred it to the Legislature regarding good roads; and Dr. McCaskey can only be present for a few moments and we will suspend this discussion for that length of time in order that we may be favored with the remarks of Dr. McCaskey.

DR. McCASKEY: Mr. Chairman and Gentlemen of this Institute: This road question seems to me to be almost as important as the various ways we try to figure out raising cattle and avoiding disease in our crops, because if you don't have a good way to get your stuff to where you can sell it, why the expense of transporting our products is going to eat up a good bit of the extra profit you make by knowing how to grow and improve our stock. When I was asked to come here to-day I felt that I did not have any particular message to give, because you men know as well as I what we are up against on this road proposition. The thing is, how are we going to better it? That is the point we have to decide. Now there are several ways and the first and most important way is for each one of us in our own sphere to ask ourselves what we can do where we live, in our own circle, our own Senate. That is what I did. I am a country physician. I am not a road maker by scientific study. I simply am a practical road supervisor, because I asked myself that question: "What can I do in my own county, on my roads in my township, under the antagonism of my section? And here is how I got into it. There is a road called the Witmer Road one and one-half miles long, made of earth, just ordinary glue when the frost is coming out of the ground. My practice called me over that road five or six times a day. I drove it both by horses and auto. All efforts to get that road improved were of no avail. The road was like this: Hollow in the middle, high on the sides, full of deep sink holes. Sometimes you would sink half ways down to the axle. There were rough rocks sticking in the road and no efforts made to drain it. After every storm the water lay there for a week or ten days. I asked my supervisors nicely and as politely as I could to fix it. I said: "Gentlemen, I am up against this proposition. I want you to do something. Won't you please?" Well all I got: "We will do something later on; we have no money now." All right. I waited and waited and got back at them again. Nothing doing. So I got tired. I said, "Well, will you give me permission to repair this road, if you cannot?" I got the permission of two of the supervisors out of the three composing the board of supervisors. Well, I got a drag from the Lancaster Automobile Club, by the way, they furnished drags for nothing to anybody that would use them. I got a drag and started to drag this road to improve it. I did not know much about the principles of dragging and the first time that I dragged it, it was soft and that night it froze and made it a little rough for a day or two, but

after the frost gradually came out I kept at it and dragged that road for several months and finally got it in such shape it was passable and respectable and it was a good road. I paid the bill myself. It did not amount to more than a few dollars. The supervisors then had a roadmaster and he did not like this. It was in his territory and he felt the reflection. It struck him that nobody should take some of his responsible from him and make improvement. If that man would only have been too glad not to bother about it. He didn't, so I did. They waited on me and said: "Doctor, you got to cut this out. You are damaging the road." Well, they could not show where I had damaged the road and, as I had the official consent of two members of the Board of Supervisors, I said: "Gentlemen, this road has got to be fixed and I got your consent and I am going to go ahead and fix it. It is up to me." I put it up to them and went ahead and dragged the road and got in it good shape and by the middle of May, just about this time, the Supervisors came to Lancaster and they swore out a warrant. They had an injunction served on me for injuring the road and they had that injunction served by the local constable and stopped me from my right which I used and which was improving their own township property. Well, of course, after the injunction I cut it out but the road was fixed, at least passable. But I wanted to know why these men had secured this injunction, just like any of you men, if they would come to your door and say you can't do it. You want them to show you. So I brought these supervisors right into this court room. The witness box is right here, and I made them tell the court why the injunction should not be dissolved. They had their witnesses and I had mine. I had the farmers that lived along the road for thirty years, and we had pictures of the road before anything was done to it and after I had used the drag on it. We showed these photographs to the court. We had men testify that knew the road before and after; took the testimony down by means of the court stenographer and the court reserved decision for a period of a month or two and then they made a decree to the effect that the wrong legal procedure had been taken and so of course the thing fell at once. But I used what the court stenographer had written down and published it, what these men said. I printed that and distributed it all over the township so that the farmers could ascertain the truth, just what was said by the road officials and the farmers who used the road and by myself who fixed the road, and the outcome, gentlemen, was very clear. Just like it would be in your own county. Where everybody knows the truth and the facts there is a general verdict. I ran for supervisor and I was elected and that is how I happen to be in the road business. This is what confronts all of us whether road officials or not. It is what each one of us can do in our own way. If you have a bad hole in front of your house or gate and cannot get it fixed why go out and fix it yourself. See your supervisors first, consult with them, see if they won't help you, see if they won't permit you to help them out and, rather than wait, after you have gotten power, go out and fix it yourself. There are lots and lots of ways to help in this road proposition. The ladies that go to church with their husbands, the children that go to school, the farmers that have to haul their lumber and oats and wheat have to use these roads. When you strike a bad place don't only say it ought

to be fixed. Take out a piece of paper and pencil and write down just where that bad hole is and submit it to the road officials and tell them that this thing has been under your observation and that you would like it fixed and see what they are going to do about it. If they say they will do it when they can, that is not the thing. You want to find out what day the repairs will be made and make it your business to be there on that day and if nobody shows us, find out why they don't show up. This may be a rather strenuous policy, but it is the only way I find you get your road improvements. And gentlemen just remember this, that this road proposition depends on us a great deal more than it depends on the Legislature. For example: Mr. Jones, of Susquehanna county, introduced the Jones dirt road bill. He asked three million dollars appropriation for the use of each of our townships so that we could get fifty cents on the dollar for every township that had a cash tax. What happens? Why the Jones bill got knocked in the head and it is almost down and out. And it came out of conference last night there was five hundred thousand dollars to be awarded to the Jones bill for two years, two hundred and fifty thousand dollars a year for this great State with 4,500 townships. Why, look at it.

I am sure, members of this Institute, that this is a pleasure and I trust that you will not forget that it is just as important to have the transportation roads between the places you grow your stuff and sell it, that it is just as important to have these roads improved, and you have a part to play in it, as you know how to sell your stuff at a profit or how to grow it successfully. (Applause).

MR. RANDALL: This is my first attendance on an institute of this kind and I am very grateful that the good Director had fixed the institute in the place he had because as I came down over the hills in my own county and came down to Lancaster county with her vine-clad hills and beautiful valleys and noticed her beautiful farms and came down into her city and got acquainted with her people. I found that she was rich not only in agricultural lines, rich not only in the beauty of her country, but rich in her proverbial hospitality that makes it a pleasure for people to come and have people to meet.

So I say that in coming here to-day I have no criticism to make upon the way institutes have been conducted. I agree with the gentlemen that has spoken about the bad and hard times they have, because they can testify, if they wanted to, that have been in my county or traveled over the hills on Sabbath day twenty to twenty-five miles. I appreciate that, and sympathize with them on that question because I don't believe in working on the Sabbath day, and I don't believe that men ought to be compelled to work on the Sabbath day, and I deplore the necessity of having an institute on Saturday night at a place twenty-five miles out; but when we have it at home we have the court house and then I prefer to have the meeting on some other night because people do not want to come in on Saturday night. I think it is better and I think it is necessary for the lecturers that they should have time to rest and to write and to go to church on Sabbath day instead of riding over the hills. Now the Director has done good work in fixing the institutes. He has sent lecturers both ladies and gentlemen, and they have done excellent work and cannot be criticized for the work done, because the work shows it self and that is proof. Our far-

mers,—of course, we are living in a small county. Our farmers have cleared up their farms and are farming scientifically since the farmers' institutes started and put a little money in the bank besides.

Now I want to tell you that I was going to ask the Director to give us a little more, but when I came to Harrisburg I was knocked out because the appropriation was going to be cut down and we would get less than we get now. What a wonderful thing that would be! To curtail the business of the farmers of this State, to cut down the appropriations that are used to teach the farmers that which they want to know and what they must know if they succeed in arriving at the top of the ladder. I heard last night a lecture on "What is the matter with the Pennsylvania Farmers." I say one thing wrong in Pennsylvania in my estimation is that they don't stand shoulder to shoulder and say to their Legislature we want our share of the money appropriated in this State and we want it put to the greatest advantage and best advantage that it can be put, the agricultural interests of Pennsylvania. Everyone knows it is a great interest. Why we boast in our county of our oil and gas and down here you have your iron and coal, but there is none of them compare with the lessons in agriculture, but still they go into the Legislature and get by some plans or other larger appropriations for most anything along these lines while the farmers get small amounts appropriated to agriculture. Can that be remedied? Yes, it can be remedied by standing shoulder to shoulder, by doing just as they do; give them to understand we have to have that and are going to get it. Just yesterday they appropriated and opened up a way where they can spend ten million dollars to extend the Capitol by appropriating \$250,000 now. Yes, it is a good bit, and I want to tell you that men passing over the afternoon of life will never live to see the end of it. That ten or fifteen million dollars will be spent of the State's money to carry that out and if there is no more money for agriculture they will spend that. I say that ought to be broken up.

Another thing, there are some appropriations ought to be made to go to the counties to reduce the local taxation which we know bothers us more than anything else. Now the Legislature in its wisdom thought that we should not have the right to vote upon the question or should not submit the question of local option. They say you cannot have the privilege of voting upon it. Now sir I say if they are to fasten that upon us, if they are bound to give the saloon, these primary schools of the devil, full sway, that we should have the money derived from them to be devoted to agricultural interests in the State of Pennsylvania; every dollar of it. Now if we put our shoulders to the wheel, I tell you if we pull together they will listen to you. I have been there myself. I am a Missouri man. That is, you think I am. We can fetch it as sure as we are here to day by working together and in the right direction and make them appropriate enough money for agricultural purposes. We can appreciate and increase the benefits by experiment stations and State College and Farmers Institutes, sending out bulletins and putting the information into use and there should be enough money appropriated and sent to carry out all of these things and I say we can do it.

Now one thing more. I want to make a suggestion. I have no criticism to make of the county institutes. They are doing noble

work. But it occurred to me, Mr. Chairman, that the itinerary of the speakers should be arranged, could be so arranged throughout the State so that they would have their Sabbath rest and let them come back to the Normal Institute the following year and let the leaders make a report, written or oral and have it printed in the proceedings of this convention and have them let the people see what progress has been made in the counties and wherever there is anything necessary to be remedied let them state it and if it hits us poor county chairmen all right, we will stand it. If that could be done and the itinerary so arranged that these good men that come around and assist us and do such good work could make a report to this convention and have it printed, then we could tell how we were progressing. Because we must progress. We cannot stand still. We must, as the gentleman said last night, go to the top of the ladder. We must go on and if that would do it I only make the suggestion for your consideration, and if that can be done it seems to me there will be a little more knowledge of the facts as to whether we are progressing or not.

MR. LIGHTY: Ladies and Gentlemen; I want first of all to make a plea for our county chairmen. Perhaps it was said before but it will bear repetition. I want to say that I would like anyone to go through the State of Pennsylvania and try to find a better, a nobler and a more honorable body of men than the men who have charge locally of the farmers' institutes in the counties of the State of Pennsylvania. They have treated me royally from one end of the State to the other. Brother Herr says that I have never been in his county. I know that the brother is a cantankerous fellow and I have kept out of it.

I want to make the plea that Brother Peachey made. I think there should be a clear understanding about that matter. I want to say to you, my friends, that I don't believe up to this time I ever found a man who could do seven days work in a week and continue it more than about two weeks until he was out of commission so he was unable to do real good work. I made it a rule for the past two years not to do any labor on the Sabbath day, particularly when I was in the institute work, and I want to tell you, my friends, that the county chairmen, not only one of them—I look at one just now, Brother Glover, went out of his way quite a distance to get some men to come and take charge of the Saturday afternoon and evening sessions to let the State lecturers get out and get a little rest, and every county chairman made strenuous effort to do this because before I started out in the work last fall I just kindly requested that they make arrangements so that the State lecturers could have the Sabbath rest. I believe that we should try to give the greatest good to the largest numbers. I believe, my friends, that there are places in the State of Pennsylvania where it is necessary to hold Saturday evening sessions. I believe that you have got to get the people out to do the missionary work and that you have got to hold a Saturday evening session and there is lots of territory in Pennsylvania where there is missionary work needed and we cannot do the missionary work unless we get the people out so that we can talk to them face to face, and Saturday evening is the only evening we can get them out. In the older places where I have been and where they are more up-to-date there is no

trouble at all to get them out any day in the week or any time, but I believe there are places where we should hold the Saturday evening session and under these conditions I am still willing to do a little work if it must be, for the good of the cause, on Saturday night. But I want every county chairman to use every influence in his power to eliminate that Saturday evening session and to do it, please, so that the lecturers can find a place that will correspond with the description that Colonel Woodward gave a few minutes ago. When I am at my own home, when I do a good day's work, I usually take a hot bath in the evening before I try to rest. If I go out into some parts of the State of Pennsylvania I do not find in that hotel even that one bath room that Dr. Hunt spoke about that they had over there at the hotel in Germany. Don't find even the one, so I have to wait until Saturday night and I tell you I go pretty soon for the bath on Saturday night and if I cannot have that bath on Saturday night I cannot keep the Sabbath day holy.

MR. BLYHOLHER: We have heard considerable about the Saturday evening meeting now and I think it is a matter that resolves itself entirely into the hands of the county managers. I do not believe that it would be wise for us to pass a resolution here to eliminate the Saturday evening meetings. As the last speaker has said, there are localities and places where I think it is just as necessary to hold the Saturday evening meeting as there is in any place, but I do think that if the county chairmen use the proper discretion and judgment that they can provide and so arrange the meetings in their counties so that these men will have comfortable places to rest after the Saturday meeting, over the following Sunday, without violating the Sabbath so very much if they don't want to. Now I have done this on one or two occasions: I conferred by writing to our Director of the meetings. I found that as the dates were set in the book I would be compelled to travel a greater distance and have my men out in the county on a Saturday evening where we could not secure that entertainment and bath that they deserved, so with his permission just changed the dates of meetings and therefore found places so that they could rest over the Sabbath day and go to church, too. I hope they did. I always advised them to do so. So that I think it is a matter that we ought to refer, and I am glad this discussion came up and I am sure every county chairman here will take this home with them and arrange accordingly; so I would not have the managers adopt any strong rule on this matter not to have a Saturday evening meeting because there are localities where we can reach the people on Saturday evening where we could not reach them at other times.

There are other things to talk about. It is all well and good to instruct the farmers in the matter of producing more and making two blades of grass grow where but one grew before, but it is just as important to instruct him in other matters affecting his welfare, and one of the live questions that I think he should be instructed in is on the taxation question, to show the people of the State just exactly where the farmers of the State stand in the matter of taxation, and I want to say before this institute that this is one of the live questions for us and for the instructors and lecturers to show to the farmers just exactly what position they occupy on the taxation question and I think

it is something that will wake up the farmers and the farmers' institutes if they stand up and speak on that question and it may be so that we will have equal taxation on all classes of property in Pennsylvania. Many of them will stand up and make that assertion; so that I hope in the future that question will be taken up by the instructors and that they will study the question and find out exactly what taxation is placed on each class of property in this State.

Then the school question ought to be discussed more. I think there are vital changes that ought to be made in our country schools and by discussing matters in farmers' institutes we can arrive at some conclusion and the farmers will be benefited. So I would say that is another of the questions that ought to be taught.

Another thing that ought to be taught—I hesitate not to make the assertion right here although my good brother right in my rear stands at the head of one of the greatest farmers' organization in this section—I want to say that the farmers' institute lecturers ought to teach the farmers to stand together when they go into this organization or that organization or whatever, and show the power of organization and what can be done if the farmers stand together, which we had a lesson of on Monday afternoon. So that I say that is another question that ought to be talked up in the institute, the power of organization and the power of standing together and why that power is necessary.

These are a few things that on the spur of the moment occur to my mind that ought to be taught in these farmers' institutes.

MR. BARNITZ: Mr. Chairman and Gentlemen: While these gentlemen were speaking I was trying to find out how much religion I had left after travelling around on Sunday. It was particularly hard on the preachers and our corps of lecturers had two preachers in it and it was a little bit new to us but we were somewhat relieved in the matter. The chairmen had heard that there were preachers in the crowd so that the congregations very kindly arranged for us to preach in the towns where we stayed Sundays. Now I did a great deal of thinking while Mr. Peachey was talking and I want to say that I know that it was all conscience for I remember out at Tioga when I was sick in bed on Sunday that he and Mr. Fassett pulled me out of bed and made me go to church, and the next Sunday Mr. Peachey happened to be sick and I pulled him out of bed and made him go to church, and that second Sunday though we fellows had to travel that day. There were three of us. We attended three church services and I had the pleasure of preaching once. When I went home the people wanted to know what sort of fellows I had travelled with. I said, good men. What did you do on Sabbath? I said, last Sabbath we went to church three times; we heard three different preachers. And I want to say that I am proud to hear such a discussion here, for I want to say it sort of stretches a fellow's conscience away out until there is not very much temper left in it when he has travelled here and there on Sabbath day, and especially a preacher who was in charge of a church at home and had another minister filling his pulpit. I wish that could be in some way arranged. It is a very difficult question to decide, but it ought to be for our comfort and for our conscience. Isn't that true?

I was thinking of the county chairmen at the institutes I attended, and how nicely they treated us fellows. I suggested to some county chairmen the unnecessary questions that were handed in that killed so much time, and I want to advocate here this afternoon the written questions. I don't know how you feel about that but I find that there is lots more hot air in the written question than the question than the question that a man thinks over before he sends it in. There is a whole lot of unnecessary questions. I remember one lecturer was kept on his feet an hour and a half. Seeds here—is that so? Lots of questions that he had answered in his talk and questions that would not have been asked if they had been handed in to the Chairman, and then the Chairman had a conscience and left out the foolish questions. Now a preacher on a lecture corps in a certain sense is in an unenviable position. You ought to have seen. We were consulted about all sorts of questions. One lady wanted to know why it was that there were two preachers on that lecture corps and they didn't open the exercises with prayer. I felt like saying: "My good sister, come right back here if you need prayer so bad and I will pray for you." That was a question that came up many times, the question of prayer, and I had the privilege of solving it pretty often for when the regular preacher was not there the preacher on the lecture corps was put into service. You have been reading about these trials for heresy. I want to say here that I do not believe it is necessary to open farmers' institutes with prayer. You may have your opinions of that but I have mine. It is a matter of business. I advocate that the people ought to do their praying before they get there and back their prayer with their hustling for the farmers' institute. Just as in a church that I took charge of not long ago. I walked down and I said, "Now we will take the offering," and when the plates were returned they stopped for me to offer prayer over the collection and I didn't offer it. I said, "My friends, we won't have a prayer over the collections." I said, "It would not matter how eloquently nor how long I offered prayer, it would not make that collection any larger and it would not go any farther and what is more, if there are any here who have not given to their ability it would not excuse their conscience." I had to leave out some of the questions that came in, and we all laughed, and I believe in a good hearty laugh and good jokes in our talks. As I say, the preacher is in a somewhat unenviable position. He is advertised too much. Why everytime I got up to talk on chickens the chairman would say, "Now this man knows all about chickens. He is a preacher and he is full of chicken." Well, you ought to see the questions. Here was a lady sent a question up to me saying: "I have just had a proposal of marriage and it came from a man who is not a Christian. Would you advise a woman who is a Christian to marry a man who is not a Christian?" I saw the preacher sitting over in the other corner. I said: "I am running a chicken ranch. I will refer it to this preacher over here;" and I walked over and he got scared and he said he hesitated. I said: "I guess I will have to answer this." I told that lady she had better marry him quick for it might be her last chance.

I want to emphasize what this brother said about Sunday. We are away off from our homes and the comforts of our homes in most

places, and what is more we want to go to services and have the rest so that we can enjoy the church services and do our duty as Christians as well as lecturers.

MR. KERRICK: I have no fault to find under the present direction of our county institute management. I do not know but Brother Peachey might be insinuating on me; still I am not positive. I want to say for Brother Peachey and my friend Cornman and Preacher Cox, they did very efficient work in Bradford county.

It seems to me that we have been far from the question this afternoon, how are we to benefit or better the institute? I am not prepared to say. I think, as has been stated by my friends over on the right, that what we want is to stand together shoulder to shoulder and let the people in the State know that the farmers mean to stand by their organization. When the members of the agricultural societies and members of the State Board, the Grange, the Farmers Alliance, all acting together, come down to the Capitol of this great Commonwealth united, shoulder to shoulder, the members of that Legislature will understand that we mean business. We are coming to that, I think, ladies and gentlemen, and I want to congratulate my friend, Brother Martin, for the success that he has made out of this agricultural society. We had the honor of having him with us in Bradford county and the people remember the lecturer and the Director with a great deal of respect. I assure you, ladies and gentlemen, that the work in Bradford county has resulted for good and I am asked from different parts of my county for more institutes, showing that we need more money in the great Commonwealth of Pennsylvania to run these institutes so that we can get to the people. Now, gentlemen, let us get down a little closer to the question. I would like to hear from some of these older members. I don't know how we might better conditions. The thing to do is to get direct to the farmer and get him up to the institute, get him interested in the discussions, in the rations that we feed to the cow and how to produce more corn, more wheat, and so forth. That is what we want to try to do and in managing that matter, if we work it right, we can get them all interested.

As far as Brother Peachey's Saturday evening matter is concerned, I think if he had a good helpmate that there would be no trouble about Saturday evening. Ladies and gentlemen, I thank you.

PROF. MENGES: Mr. Chairman, I don't think that we have discussed the subject this afternoon but a number of things have come up here that I think we ought to bring to a point. The first thing is the Saturday evening session. I don't think that any of the institute managers want to eliminate the Saturday evening session. I know I don't. I would be mighty glad to get rid of it. That is all right. But if it is for the good of the cause I am willing to sacrifice a whole lot for the cause. That is my idea about it. Now then here is one thing that I have been thinking about it:—Mr. Blyholder brought out the idea—That very often we are away out there somewhere in the corner of the county; no railroad; no hotel; and the only possible way of getting out of that place is to drive away on Sunday. I have travelled last winter—one time we drove 24 miles on Sunday morning. I don't

know exactly who to blame. If I knew I would say a little more. I don't know exactly who to blame. I had a notion that if the managers of the institutes and the county chairmen would get together—I better put that this way: if the managers of the county institutes of the sections, if they would get together and start the itinerary at one end of the county and from that county to the next county and in that way have it so arranged that when Saturday night comes these men can be in a place where there are hotels or railroad facilities to get away to hotels, I believe that could be arranged; if the chairmen of the counties of the sections would get together with the manager of the institutes and simply mark out an itinerary from the beginning of the institute to the end of them, that they could manipulate it in such a way that all these difficulties that Mr. Peachey is finding fault with, and that I sometimes growl about, and Mr. Lighty don't like, and the rest of the fellows walk away from when we want to stay, I say I believe that that thing could be arranged and managed so these difficulties could be done away with. I am not ready to offer a resolution but I believe the chairmen of the various sections in the State ought to get together with the county chairmen and make out the itinerary from one end to the other so that we can be put to that place where there is comfort and the possibility to get away if we want to.

The CHAIRMAN: We will have to limit each and every speaker to five minutes.

Mr. Shuey made one reference here that I would like to answer if I may be permitted. I am one of the men that is here to say, and I have said it before at these meetings, I don't want any county chairman to serve without pay. If any men in the State of Pennsylvania deserve pay for the services they do and the services that are telling, it is the county chairmen of the farmers' institutes of the State, and I say they deserve pay.

MR. JOEL A. HERR: Mr. Chairman, I am sorry to say what I have to say. I believe the object of the meeting was to talk about or have a conference on the farmers' institutes, the better manner of conducting them and how to make the best institute; but we have drifted about and have been talking about the subject of Sunday work and the hardships we have to endure and these very fellows are tumbling all over each other to get on the institute force. I don't know whether that is correct or not. I want to say we ought to come down to the subject, how best to conduct an institute and get success; the impressions we leave on the people is what we want to know and instructions in the management of our county institutes. I am not going to make a long speech. We want to impress the people with the importance of our calling. That is the first and foremost thought that ought to be brought out before the farmers' institute, to teach the farmer to respect himself and his business, and if we don't do that nobody else will respect us. This is the first and most important point to make. In order to do that we must speak respectfully of our calling; we must show how to make it more agreeable, how more convenient, how to better our home conditions and circumstances of our assistants and make it more desirable to keep the boys and girls on the farm and to make farming the great business it ought to be. We ought to learn to co-

operate with each other and to help each other; and all these things could be brought about by the farmers' institutes. There is a great scope of work for the farmers' institutes to do, and the question narrows itself down to each community, what shall we do that will result in the greatest good for our community.

I have nothing to say about the care of the farmers' institute speakers. They are well enough cared for. There are instances in which they suffer. I know that I have endured with them and I never was much the worse of the circumstances. If I accept the work I must accept it under the circumstances it comes, and I have always tried to manage to excuse the speakers when it was necessary that they should go home and to use our local talent. Another thing, is to get the people interested, get them to take to the work, and to ask questions, and let the institute lecturers set the conditions before them and instead of talking merely to be heard, talk to say something and tell the people something they ought to know.

MR. WILSON: Mr. Chairman, I think about the Saturday evening meeting, that could be avoided by the county chairman himself. He has three or four days of institute, owing to the size of the county. I was saying this, that the county chairman alone could arrange for the avoidance of any trouble on Saturday evening. He has the number of days for his institute and he can arrange it. If he has a place where there is no good hotel accommodations, let that place come first in the week and then wind up where he has better hotel accommodations and where the man does not have any travelling over Sunday.

Now one of the questions which I think is before us to-day is, how to better our institutes. That one we should have spent this afternoon on. I think the best way to get interest in the institute is for the institute manager and his friends to talk up that institute. You cannot go out for a week or a month, but talk everytime that you get an opportunity; talk to the neighboring farmer, say something about farmers' institutes, tell him what a good thing it is and ask him to come out the next time to the institute; tell what you try to each them, that they are doing things; have everybody and anybody come to that institute in your neighborhood. You cannot take a week to talk about the institute and get interest created, but you can take time to do it. Just as talking about the county fair. You would not expect to prepare for the fair a week or two before. I have been a director of the county fair for many years. We commence months before and talk it up to everybody we meet. And it is the same way we should do with the county institute. Why, take the preachers; they tell their audience what subject they are going to preach on the next Sunday and sometimes they announce a series of sermons away ahead and to-day they are advertising their subjects in the papers away ahead, and in that way they create an interest and get the people talking about it; and you will find the best way to get up interest is to talk to everybody you meet about the farmers' institute.

MR. SCHULTZ: I don't want to take up much of your time. I haven't anything on your subject, but I am interested in the talk the doctor gave us on roads. I believe the success of the farmer brings

up with it the question that he eventually must make the mud roads in his neighborhood. I tell you what I did at my farm. We have a road running through it and half of the farm lies on each side of the road. Everytime it rains we have a split log drag and my men hitch on to the drag and drag that road and that road is in perfect order and keeps in perfect order if you follow it up. You want to have the comb so the water goes into the ditches instead of standing on the road. Let the farmer understand that he is responsible for the road passing his property. The sooner we can do that the better for us all. We must make the road or pay for it and if we make it ourselves we know it is right. If the farmer knows it is in poor condition it is a reflection on his farm, and eventually we have all our roads made, all the mud roads. We can never get away from the mud roads. The stone roads should be made by the State. This is one of the ways to do it, and I think if we would try to do that, that would be a great relief on this road question.

MR. HULL: There has been considerable said this afternoon as to what should be done to interest the farmer. The time has never been within the history of business in this country, the time has never been within the history of everything in this country, when the farmers have been more interested in their calling than they are at the present time. Now I am not willing to give any one department full credit for bringing this about. The Department of Agriculture has done its part without discredit, but the agricultural press has also done its part, and the agricultural colleges and the editorials in our metropolitan farm press. I am impressed more and more with the growth and progress made in the science of farming. Our experiment stations are doing their work and, all in all, I think that the time has never been that the farmers were more generally interested in their calling than they are now. Only a few years ago there was a call made at one of our round-ups by counties so as to know what the effect had been in the trial of raising alfalfa. In very few counties had there been any success. To-day, through the impetus given by our college here, the Department of Agriculture here, the metropolitan press, we are succeeding in all the counties in raising alfalfa, and it is a farm crop that we cannot do without. The spraying of fruit trees and the spraying for potato scab and fungus growth in the different plants have received great impetus. The farmers have got the information necessary to combat these and they are doing it, and the time is coming and near at hand when we will not only be benefitted by the instruction at farmers' institutes, through the press and bulletins, but a better knowledge of the insect foes will be brought about and the means brought about as to how to combat them, for we are going to raise better, fairer fruit than we have been, so that it has been a blessing in disguise. Now I feel that the Department has done its part, that the press has done its part, and that our State College is doing its part, but one thing I want to say right here, that with all the letters that I have received to use what little influence I have in bringing about experiment stations over the State and for my influence over our representatives to have an appropriation for these different branches, I want to say that I am in favor of one central place. I want that the State Farm, and I want that supported so that it will be a credit to the State, and I want it so well supported that

it cannot be discounted by these experiment stations which are springing up, which will grow year by year, becoming top heavy year by year, and require greater amounts of money to be appropriated for their support. Let there be one and that one well supported.

DR. CONARD: It seems to me that we as county chairmen could do very much to assist the Director in arranging the schedule or program for we are all acquainted with the lines of travel in our counties. We have gone over the most of the county and then we know what railroad stations in the county will run us nearest and the best line of travel and best hotels, and if we would, in making our suggestions for the places for the institutes put them in the order that would suggest the line of travel and say that it would be very convenient to travel to those places in the order given, or something of that kind, it would give the Director a little information that we have at hand,—because we live there,—that he would have to look up and it might help the thing along.

I want to talk about the movable schools. The movable schools seem to have led up to a better and more thorough discussion and consideration of the few topics than the institutes. There has been three topics assigned to each movable school, namely dairying, horticulture and poultry husbandry. Those are the three subjects assigned for discussion. The schools consist of four days and evening sessions, allowing two days for dairying. Now, in order to consider dairying thoroughly in two days why you want to take it up in certain order. You want to take up a certain feature first, another second and another third, and so on, and there is nobody knows better how to do that than the ones who are going to teach it. The ones who are going to give that instruction can tell better how they can do it best than any other ones. It will not do in getting up the program for the movable schools to make it exactly like an institute program. The county chairmen will get them out of order, not because they want to oppose the system adopted by the experts but simply because they do not fully realize the difference between the movable schools and the farmers' institutes. Now, I have some topics that are not dairy topics at all and it has so happened that questions were taken up not on the lines of dairying, taking the mind entirely away from the subject under discussion and instead of having a dairy session it was absolutely a miscellaneous session. These programs are printed in advance of our arrival and they are distributed very generally. Nearly always the county chairmen have taken an interest and these programs are distributed out amongst the farmers and they come at certain times expecting to hear certain things and they go away disappointed because we have to tear these programs to pieces. We cannot help it. We have to do it in order to fulfill the logical mission of the movable schools. So they are very generally and very frequently torn to pieces, more or less. I think the county chairmen should consult a little with the Director as to how these programs had best be made. I want to make this suggestion: That in preparing these programs we set certain days for certain subjects exclusively. That is, if we have four days session, give the first and second days exclusively to dairying and the third day say to horticulture exclusively and the fourth day to poultry husbandry exclusively. Now that seems to be a better and more con-

venient way to present these subjects, and have no other questions injected into the dairy sessions but dairying and the same with the other two subjects. I make this suggestion that the county chairmen confer with the Director and get the necessary information and get the programs more in conformity with the object of the movable schools, that we may spend more time on one subject, going further into detail and getting more out of it.

MR. T. J. PHILIPS: I do not know whether it is hardly worth while for two Chester county men to succeed each other. I suppose Secretary Martin and myself are the only two men possibly in this room who can speak of the institutes from the beginning to the present time. We were both Members of the House and Members of the Agriculture Committee when the bill creating this department became a law. You remember that in the beginning we imported our institute men from other states, Ohio, New York and so forth. There were no men in Pennsylvania thought fit for the work. In a year or two men in this State were equipped for the work. How well they have done it I leave to you to judge, and I speak freely because I have been interested from the beginning until a comparatively recent time. I think I am capable at least of judging what has been done, what has been accomplished. I was prompted to take this thought because of the meeting day before yesterday at Harrisburg to get those city men who control these committees to give us the funds we need. If they would know of the good work and of the profit in dollars and cents that has been accomplished through this department I am sure they would never hesitate before making that appropriation. We were told this morning that the poultry industry in Pennsylvania amounted to over \$20,000,000 in eggs alone, and while I am no poultryman, still I was a dairyman and know more about that end of it. I have not the figures but I honestly believe if it was possible to gather them that \$20,000,000 represents an increase of egg production due to the farmers' institutes far greater than any annual appropriation; so that in just that one line of increase in the chicken industry the farmer is entitled to that appropriation.

But that was not the line of thought I wanted to speak about. I speak freely on the subject because in a sense I have graduated from the institute work, but I have been over the country and I find that it has spread abroad in this State a great influence. They have had a great influence. As one of our friends on the other side of the platform said, possibly no greater influence has been exerted than that of elevating the farmer and his calling. He did not consider himself a business man. He was not a professional or even a good business man. To-day he ranks among the first in the land and to be a successful farmer he must be a good business man and he is so looked upon by the youth. Only within the last year a young man came to our town as principal of our high school. He came from another county, an entire stranger to me and after he was there for awhile I learned that as a boy he had heard me discuss a problem in a German county town at noon one day during an intermission in the session of the institute and he said that here was a farmer who could stand upon his feet and talk intelligently. It was an inspiration to him and he determined then and there that he would secure an education and that he would

be able to talk and express his thoughts, stand upon his feet and express his thoughts as that farmer did. And so this shows that you are unconsciously doing a great work in this State, that you know not the good of and no man will ever know and it behooves you to be careful as to what you say and what you do and the manner in which you deport yourselves.

I believe that one of the greatest works of the farmers' institutes in this State has been the elevation of the farmer's wife. We have preached better country homes and from my own personal knowledge I know that the institutes have made thousands of better homes. We have had the farmer spend a little of his money for modern improvements in his home and to-day thousands of them have them because the institutes put the thought and desire in their minds to have them. We have done much to relieve the monotony of the woman's life upon the farm. I was going to say drudgery, but I believe if the institutes will continue along the lines of teaching the doctrine of better homes and elevation of the farm woman in making her labor lighter and getting her hours of rest and all that tends to elevate, the institute workers of the future will continue to do the good work that has been done in the past.

MR. A. P. YOUNG: As I represent one of the counties which has been endeavoring to hold movable schools I want to say that in my own county the movable school is superior to the farmers' institute in that it gives more time to discussion of questions that are taken up. They can be gone into more thoroughly than they can at the farmers' institute and consequently are an advantage. But as to the making up of the program for the movable school, we have never attempted that in our county. We have depended upon the symposium sent out by the Director of Institutes and the arrangement of the topics has been left entirely to the speakers. We had Dr. Conard in our county and Prof. Cooke there and they took up the dairy question, and they showed the handling of milk and all that kind of thing, and judging of cows, went to the cattle and looked over the cow while they explained the different points. Now our schools heretofore have been confined to the topics that were mentioned this afternoon, between three speakers. Now I think it would be well to vary that a little. Let us have the cereal question taken up and perhaps the raising of stock in the different departments, so that we are not confined, so that it does not become monotonous. To my mind the growth of the agricultural interests depends more upon the movable schools of agriculture than upon any other one thing. The institute has become rather lagging. It is no longer as interesting as it should be and the topics should be taken up and treated by men equipped to treat them and capable of treating them and treating them fully so that the people can come there and get ideas and they can go home and sleep over them and come back the next day and get questions answered that have come up in their minds as they thought the matter over. In these things the movable school is superior to the old farmers' institute.

MRS. ZEIGLER: I thought I would like to make a little plea for woman's work in this institute work. We are told to say what we thought would be for the betterment and the interest of institutes and I feel that woman has a great work to do along this line. Indeed it is

very necessary for the women to be helped and taught along their line of work and if the woman has got her share of help and encouragement she can make the satisfactory, solid home that that farmer needs for his rest and recreation when he comes in. I think it is just as necessary for the woman to have some help and encouragement because her work is necessarily more confining than the man's. He goes away from the farm and out to the stores and the town much oftener than the wife does. It is that that causes the humdrum of farm life; and so even if she is a reader she has no time to take along that line and, as I say, life becomes more of a drudgery unless she has help to see the beauty and sentiment of farm life. Now while I think farm life is the life to live I know a great many people think it is lonely, but I would not exchange the farm life and kitchen for the city life, and if we could get our farm men to see this and realize that their own homes would be happier, what a blessing that would be. And then we need to see that we have some help to care for these little lives that are entrusted to their care; this child life and child nature. Help them to teach them purity of thought and action. I see often that we have lost sight of the high sense of honor that our fathers and grandfathers had before us and it is because in this hurry day and age we do not give the right care and the training to our children that we should. We allow the cares and worries of the day to engross our best thoughts. That is all wrong and I know that women will come out to the institutes if they know that there is a woman speaker on the force. I have been at institutes where they came to me and said, this is the first time they had a woman speaker there and they hoped the Department would never give an institute without a woman speaker. And I think if the chairmen would ask to have one of their speakers a woman on the force and send out good earnest workers who have the interests of their sisters at heart that the institutes would be very much improved and bettered and the uplift of the farmer's home will be accomplished in a much shorter time. I know there are men talk along this line but not as many as they should have, and I think that the women who can sympathize with the women and that have gone through all that is required of the women on the farm, can reach the women's hearts much more readily than the men speakers can, and I think it is very necessary that they should be on the force.

Now I have been told that some of the men do not care to have ladies on the force with them. I don't know how true it is. I am sorry if it would be, and I think that any woman that goes into this work makes up her mind to adapt herself to circumstances and take things as they come and will not do any fussing or grumbling if they meet with any unpleasantness any more than the men. Of course, they will have to accustom themselves to be ready when the team is ready so that they do not keep any one waiting, and if the men feel so disposed to show them any little attention or help them along with their luggage the women will be grateful for it. If the women have luggage they feel that they are capable of taking care of their own. I think in that way the men will not object to women on the force, and I hope the day will come when there will be more ladies on the force.

MR. BRONG: Mr. Chairman. I hesitate at this time to introduce a new subject but the question that I will ask can be answered in a few words. The question is this: In our county—I suppose there are

others like it—we have more calls for regular institutes than we can supply; that is, we have calls for more places than we can locate the institutes at. There are certain of these places that have had institutes constantly, not every year but perhaps every other year or something like that, and others of these places that have, as far as I know, never had an institute located at them and therefore the attendance, we anticipate, would be rather light. In fact, last year we located an institute at such a place where there never was one before and our attendance was light. Now the question is this: Is it best to locate an institute where there never was one and where we anticipate a small attendance or to locate them where they have been and where we know we will have from three to four times the attendance?

The CHAIRMAN: In reply to that I would say if it is a good farming country and the farmers want to hold an institute there, give them a trial and if they make a failure the first year charge it up to them and don't go back. That is the way I have adjusted some of the troubles in my county.

I feel that I have got one of the counties of which I believe the Secretary is proud with regard to the attendance in each and every year, regardless of weather conditions. The farmers' institutes of York county have bettered the schools, bettered the homes, bettered the farmers and bettered the Christianity of our county. We have in the last two years been holding an institute in a hall adjoining a hotel and even on Saturday evening we have had good order and I am proud of the people, for during the institutes we have not been troubled with drunkenness and we have never been disturbed. Our hall opened right into the side room of the hotel and it was just as orderly as any church that I ever sat in in Pennsylvania and I believe that the farmers' institutes have done a great deal toward bringing about this betterment in our county. We advertise our institute meeting first and after we have selected the places, on the sheet which I send back to Mr. Martin I designate; for instance, if you are coming to our county on the eastern side such an institute should be held first and following on, coming down in regular order so as to make it convenient for the speakers, and in the last seven years I have always been able to locate the speakers on Saturday night in a place very acceptable to them.

DEPUTY SECRETARY MARTIN: I have been very much interested in this discussion. It gives me information that I cannot procure in any other way. Sometimes, you know, men when they get into the spirit of discussion will say things that they will not say in cooler moments and they are apt to tell the truth there. I was so much interested in that extended discussion about landing our splendid lecturers on Saturday evening out in some remote section of the State we would almost have supposed, had we not known Pennsylvania as well as we do and the hospitality that is so universal in the State amongst the farmers, that we had a lot of territory in Pennsylvania that compared with the wilderness. Now, my friends, just a word or two along this line. I think I am able to appreciate because I have travelled with these gentlemen in season and out of season, in storm and in calm, and I have experienced hardships and I know they exist.

Here is the section known as the First Section. I notice, and I have not time to go over the entire section, but just one or two places that the gentlemen stopped at over Sunday in this County of Lancaster. In the first section they started in at Quarryville two days, Lampeter two days and where do you think they stopped over Sunday? Why in Paradise.

A Member: They came to Lancaster every night from all the institutes over the splendid trolley system.

DEPUTY SECRETARY MARTIN: Who would you suppose would have left Paradise for Lancaster.

Now just a word, my friends. There are some things that are possible and some things that are impossible. The most county chairmen understand me with me that when the schedule of places is sent in I take up that schedule and under the act covering it I fix the line of travel to be the most direct and economical in the direction. It is quite an expensive thing, you understand. But when this is fixed if it does not meet the convenience and economy the county chairman fully and readily understands that he can transpose that schedule to the way that will be the most convenient to land these speakers in the most acceptable place to spend the Sabbath day. Sometimes this may not be fully consummated. We are talking about conditions. There are times where away out eight or ten miles in a splendid farming location in Pennsylvania, where the farmers there are the salt of the earth; they have no trolley lines; they have no permanently constructed roads; they have none of these conditions; but they have good farms; they are good farmers, and they are entitled to the very best we have got, if it comes on Saturday night, and occasionally we are landed right out there. I stand up here and affirm to these speakers that it is their duty to these farmers and to this Department to endure the hardships like good soldiers and give to the farmers out there the best that is in them. There is one thing these good farmers have to be excused for. You are the most sociable people in the world and when you get these men there and you entertain them and you know you have good company, and you only once a year have the opportunity to get some knowledge and you want to get it and sometimes you talk them to death. They will have to put up with that. I am going to talk pretty plain with these leaders of sections. I know it is a splendid thing and I appreciate it, to get a good warm bath once or twice and really I believe a man ought to have a bath once a month whether he needs it or not. But look here: I never went to a farmhouse in my life that they did not either have a good pump or spring of good flowing water and they had a wash basin and tub and a lot of towels and a lot of soap. Ask for the towel and you will have the soap, and rub yourself off until the blood courses through your veins and gives a vigor like it does to everybody on the farm. That is my view of this matter.

I stand here and pledge you that so far as we are concerned we stand ready and willing to fix the schedule of these lines of travel to the very greatest conveniences of these lecturers who are under heavy pressure. We know that and we say to you farmers that you on your part will study their highest comfort and convenience. I

know you do that. You have shown your appreciation of this great work in that way, but never yield the point that because your farm is ten miles from the railroad station that you are not entitled to the best that the State can give you in this case. It is not necessary to continue this discussion on this line further. There is just one question I shall dwell upon. I am not a stickler for the Saturday night session. I never have been. Gentlemen of the county, you have fullest charge of that matter. It is in your hands. If you believe the best instruction, the best interests of the institutes in your county will dispense with that session, act upon it but take a little care. Better study that matter over carefully. Do you know that sometimes it is not always just exactly the old farmer that may not go out on Saturday night. It may not be him; but his daughters and his sons, and some of the young people that will be on these farms a little later will be there and take up the home questions, educational questions and social questions and present them to these young people in the manner that will lighten up home and farm life. We are in this business for work, good effective work that will lift the standard of agriculture and hold it up before the world. Thank you.

MR. PEACHEY: I am not here to retract anything that I have said, but I am glad for this one thing if nothing more, and that is that I have gotten you stirred up to think with me along the line that concerns the farmers' institute lecturer, and I believe he has a perfect right in this meeting, as in all other meetings, to stand up for what he believes is right and if he don't care for that personal property no one else is going to and that personal property is himself. No reflections whatever. I only stated the case as I found it, honestly and conscientiously, and if good can grow out of this matter I am satisfied. I know it is the unpopular side, but I want to say to you this, that it has not always been the man on the popular side that was on the right side. There may be exceptions and, of course, we have the rule and you have the exceptions, but whenever the exceptions become more than the rule, greater than the rule, then the exceptions become the rule, and so I hope sometime you will agree with me and will do just like is being done in other states, that Saturday night is left to the speaker and he can either go home or go to the hotel and do the best thing he can, and goes to work again on Monday morning. I have talked with some men from other states and they say this: "Peachey, I am surprised that you people work all winter and are compelled to work Saturday night and travel on Sunday." And one man said this: "That is the only thing that is not a credit to your Pennsylvania institute work." Now I hope I am not reflecting upon any of my friends, and Brother Kerrick, I did not mean him any more than anybody else. I stopped twenty-nine days in Bradford county, that county of magnificent distances. They travel from Dan to Beersheba to get to the institute. I travelled twenty-seven miles—they claimed it was thirty but it was about twenty-seven miles, to get from a farmers' institute and one of the fellows said it almost froze the marrow in his bones. So I only speak of these things. If I said anything that will add to the betterment of the farmers' institute why I am glad for it even though I have taken that unpopular side, and somebody you know must occasionally get on that side that stirs them out and possibly that stirred them up.

MR. JOEL A. HERR: The probability is that Mr. Peachey was intended for a banker because he always has Saturday afternoon off and stops at three o'clock through the week.

MR. PEACHEY: Only intended for a farmer. I am satisfied with that. I am not good enough for a banker.

Deputy Secretary Martin thereupon announced the program for the evening session.

The **CHAIRMAN:** The institute now stands adjourned until 7.30 o'clock this evening.

Wednesday Evening, May 24, 1911, 7.30 o'clock.

DEPUTY SECRETARY MARTIN: In the absence of Dr. T. J. Ferguson, who was to preside this evening but is detained at the closing session of the Legislature of which he is a member, Mr. W. Theo. Wittman, of Allentown, Pa., one of the poultry experts of Pennsylvania, will preside over the meeting.

W. Theo. Wittman in the Chair.

The **CHAIRMAN:** One of the leading subjects in the poultry world to-day is utility poultry. The State of New York, through its Legislature, has given the Poultry Department of Cornell University \$90,000 and that department with a farm of 54 acres is well equipped with the next year to carry on the great work along the lines of utility poultry. I am therefore sure you will greatly enjoy the lecture to be given now on "The Poultry Industry," by Prof. James E. Rice, in Charge Poultry Husbandry, Cornell University, Ithaca, N. Y.

I have now the pleasure of introducing Prof. Rice to you.

THE POULTRY INDUSTRY.

By **PROF. JAMES E. RICE**, in Charge Poultry Husbandry, Cornell University, Ithaca, N. Y.

Mr. Chairman, Ladies and Gentlemen: I do not know how many people in this audience are interested in poultry. I have been trying to find out. As near as I can learn most of you are delegates who are interested in everything else but poultry. I hope that there are a few here that are thinking seriously of paying more attention to poultry than they have already done and with this object in view I have selected slides that will represent some of the recent results of the experimental work, with a practical bearing. Each one of the experiments that I shall deal with have been carried out with the idea of saving money, of making more money out of our hens.

Until very recent years poultry husbandry has been looked upon as a side issue on most farms. It has been looked upon as a business primarily for women and children and men who, having failed in some other line or broken in health, think that they can retire to a little patch of land and keep a few thousand hens and, because it is easy to make a dollar or so per hen, they figure out with a lead pencil that they can make several thousand dollars by keeping several thousand hens; hence many people have gone blindly into the chicken business only to discover that they know nothing about it. And secondly, poultry husbandry as a profession has been looked upon as a great risk, as a hazard, a business for example, which the banks could not loan money on; not a safe, conservative, sane business investment. This viewpoint is rapidly changing, poultry husbandry is just now coming into its own. It is becoming a perfectly safe and a very profitable business when it is carried on in the line of our best knowledge.

The difficulty with poultry husbandry is that we are dealing with so many little individuals; that there is too much detail to look after, and consequently the amount of business that any one person can do is exceedingly limited. But in recent years we have discovered methods of hatching extensively and successfully, brooding in large flocks and very successfully, and the keeping of hens in large numbers for egg production and keeping them by easier, safer methods, and housing them in the large open air houses, and giving them free range instead of the little close "bare yard" conditions; and marketing their eggs as they should be marketed, carefully grading them as fruit people are supposed to grade their fruit, and the hens bred as scientifically as men have been breeding their horses and cattle; and as a result, to-day we have all over the country men who are keeping from 1,000 to 10,000 or more hens and keeping them more successfully than before, with greater profit than we could have expected from 500 to 1,000 hens five or six years ago. These changes have come about by virtue of the careful work by men who have studied and experimented for themselves and by the colleges and experiment stations that have been investigating some of these problems, and I think that as I show you some of the slides to-night you will readily agree that the State cannot make a better investment than in giving money for educational or experimental purposes for agriculture, and to no other branch of agriculture more wisely than to poultry husbandry, because in all these years since the Land Grant Colleges have been in operation nothing has been done for poultry husbandry until very recently. In all this time the dairyman, the fruit grower, the vegetable grower and, in fact, the man on every other important branch of farming has had his problems investigated and they have been getting the benefit of the help. The farmer's boys and girls have been taught these better methods of farming, whereas very little, if anything, of this kind has been done in regard to poultry. So we are just now coming into our own, and poultry husbandry is becoming a business in which you and I can engage with perfect certainty of succeeding and of making as much money for our efforts and for our capital as we could with any other branch of agriculture.

With this brief introduction we will have the slides thrown on the screen.

The first set of slides will deal with the problem of the breeding and selecting of hens for constitutional vigor. In other words, we are coming to recognize the fact that there are strong fowls and weak fowls, just as there are strong human beings and weak human beings; either born so or having acquired their strength or weakness through their environmental conditions. The pictures that I shall show here will indicate types which I think will be perfectly clear to you, representing the contrast of high and low vitality. For example here (Fig. 1), we have two barred rocks, one a male full sized, vigorous and active one of the finest specimens of the breed. And here you have one of the same breed that has been unsexed. He shows weakness. He is a lifeless sort of a type. You will notice the contrast. The strong male has a large round head, with the heavy curved beak, with large bright, full eye, red comb and bright plumage, in contrast to this capon with small darkened comb, long thin feet, shrunken eye and rather dull plumage. The capon runs because it lacks courage. The other one follows him very quickly if he gets a chance and is afraid of nothing.

In the second slide, (Fig. 2), we have breeds of four different varieties, all pure bred varieties; one strong and one weak in each of these four sets. This shows a strong buff plymouth Rock; here is a weak brother. You will notice that the very action indicates weakness; notice the drooping tail. Here in the strong one we have a deep body, heavy shank, and short thick neck. In the case of the Barred Rock you will find the same traits, deep heavy body with the rest of the body in proper proportions. Here you have an individual that is built on stilts, as it were; a long, lean, lank, narrow spindling type. This chicken weighs at least two pounds more than this one and this is a brother. One is constitutionally strong; the other is constitutionally weak. Here you find the same traits in the Rhode Island Red and in the Leghorn. You will notice in this instance the male with the big flowing tail, with fine large comb, heavy wattles, with splendid plumage, heavy shanks, in violent contrast to his brother here with dropping tail and with the other characteristics as I have indicated. The same contrast will be true of females as males; but this will suffice.

Here (Fig. 3) we have pictures of an experiment in which we undertook to find out what it would mean to the farmer if he would select rigidly in the fall of the year pullets that were of strong heavy body, robust constitution, as compared to some that were more of a delicate type as you see them here. (Fig. 4). Here (Fig. 3) is a pen of 25 pullets of strong vitality and here (Fig. 4) are 25 of weak vitality, and yet there is not a sick chicken in the bunch. No chicken was kept in this experiment that a farmer would not expect to keep. We kept records of these flocks for the year, counting the cost of food, eggs laid, and results of hatching the eggs and rearing the chickens and we did the same thing with the other experiments and compared the results for two years since with the succeeding generations. I will give you briefly the net results. These pullets of strong vitality, (Fig. 3) in their first year of laying gave us a profit of 40c apiece more than the flock here, (Fig. 4). They laid $11\frac{1}{2}$ eggs apiece more. The eggs were more fertile; they had strength and hatched better; the chickens lived better, and in the fall of the year when we brought them up at about six months of age and weighed the pullets and photographed

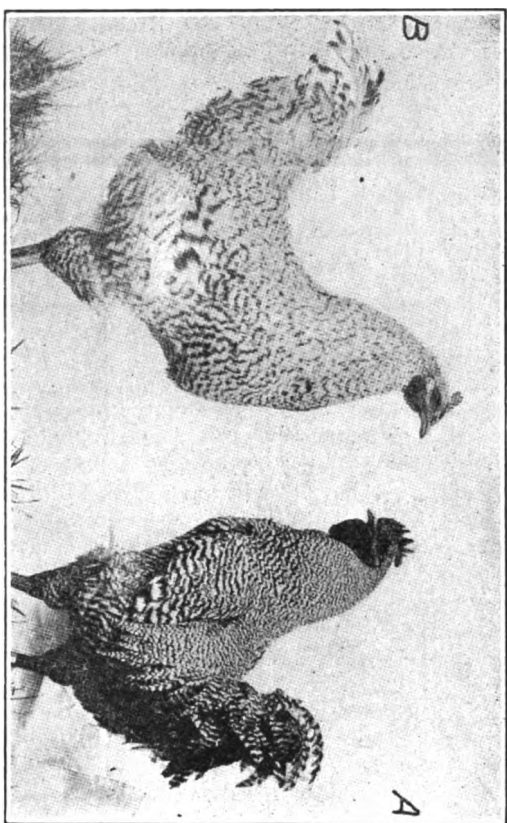


FIG. 1.



FIG. 2 A.

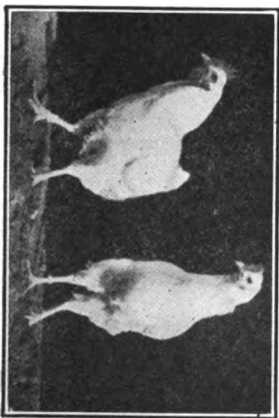


FIG. 2 A.

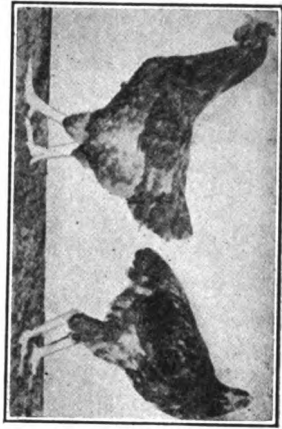


Fig. 2 B.



Fig. 2 B.

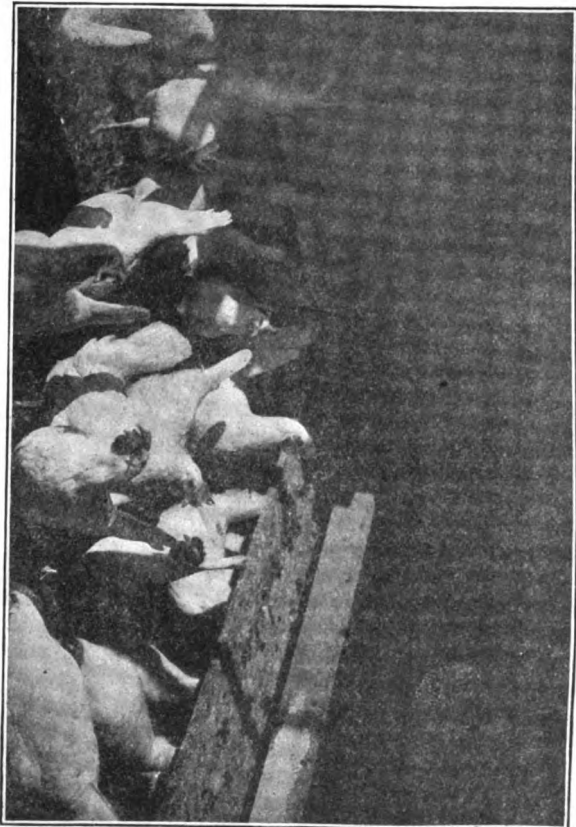


Fig. 3.

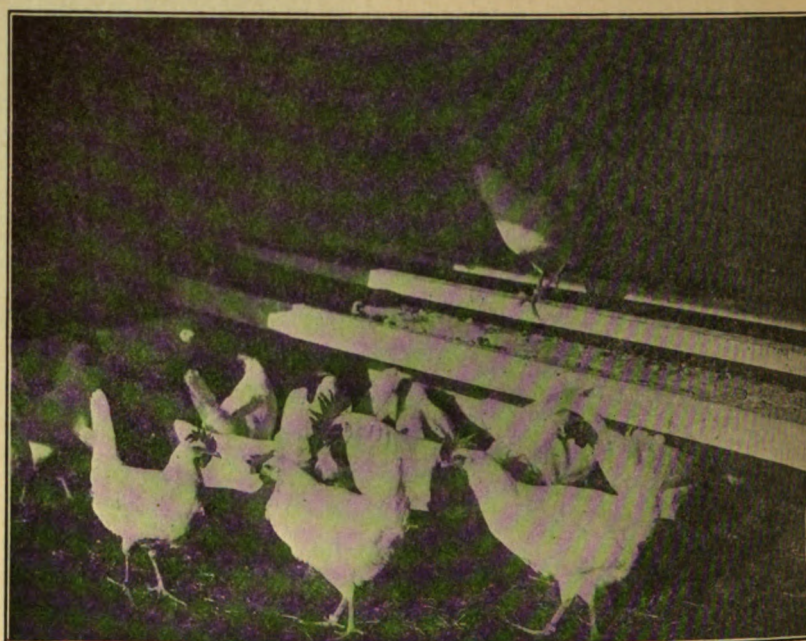


Fig. 4.



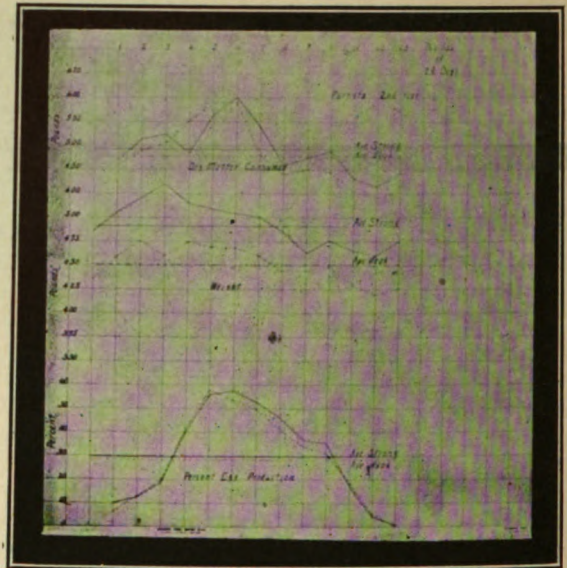


Fig. 6.

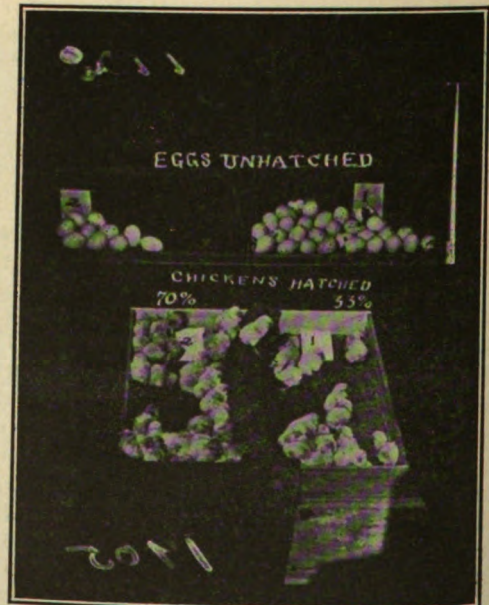


Fig. 7.

another; here (A) is another. You can see by the plumpness of their bodies, the round full eye and the well shaped head and the heavy fat legs that they are well born. You can tell at a glance that these chickens are of high vitality; while this little chicken (B) and this here one (B) are manifestly of low vitality. There is no use keeping that sort of individuals. They will never amount to anything.

Notice (Fig. 9) the same types of chickens that we have here two weeks old. Here (A) you have a large chicken, with strong body, bright eye, the body thick and shanks full; whereas here (B) you get the little puny spindly type of individual that never will amount to anything. Here (Fig. 10) you get a contrast of chickens of the same age, hatched alike, all hatched from the same hen. There is one (A) born constitutionally strong; a violent contrast with this chicken (B) of the same age and reared in the same brooder at the same time. Here is one only partly strong (A). Here is one a little better (A). That over there is an individual growing very much faster than any other chicken in the pen. Whenever a chicken shows low vitality either kill it or, if it appears to be worth anything at all to grow for market, mark it with paint so that by no chance will it get mixed with the others; feed it on sour milk and a finely ground fattening feed until it weighs three-quarters of a pound and sell it alive. Do not let that kind of a chicken live on the farm.

In Fig. 11 you see the most violent contrast imaginable of low vitality. There is a long thin "crow head," shrunk eyes, long thin shanks, long thin nose; a good for nothing individual, born so and cannot help it. You naturally ask why that chicken lacked constitutional vigor. If we stop to ask what the little hen is doing each year I think we will find an answer. The wild jungle fowl lays about nine eggs at a litter and only one or two litters a year. The modern hen is expected to lay 130 to 150 eggs and frequently lays 175 to 200 or more eggs a year. A hen laying about 200 eggs lays five times her own weight in a year; and the laying of the egg is different from the ordinary secretion, such as the secretion of milk. It is reproduction which is vastly more exhaustive process. Dr. Jordan, of the Geneva, N. Y. Experiment Station, has calculated that the hen weighing three and one-half pounds that lays 200 eggs a year, compared with a Jersey cow that gives 7,000 pounds of milk having 4 per cent. butter fat, that little Leghorn hen is consuming two and one-half times more dry matter in a year per pound of live weight than is the Jersey cow. So you see why with the quick growing, heavy powers of digestion, rapid assimilation and reproduction of the domestic fowl that they live short, rapid lives and must have a good constitution to stand up under the strain.

One of the causes of low vitality is want of proper housing. Fowls must be kept in the fresh air. In Fig. 12 is a simple little house for protecting 35 hens, where the chickens live in fresh air practically all the time. Some glass is provided to give protection in cold weather, but the object is to open the cloth window except in storm weather.

Fig. 13 shows a broody coop, a desirable fixture in a hen house. Back of the perch platform is the only portion of the house that is double boarded. The house has a concrete floor and a shed roof.

Fig. 14 shows a covered dust wallow. Here the hens will not be likely to soil or throw out the dust as where it is exposed.

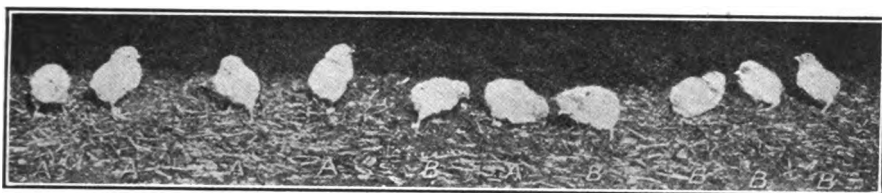


Fig. 8.



Fig. 9.

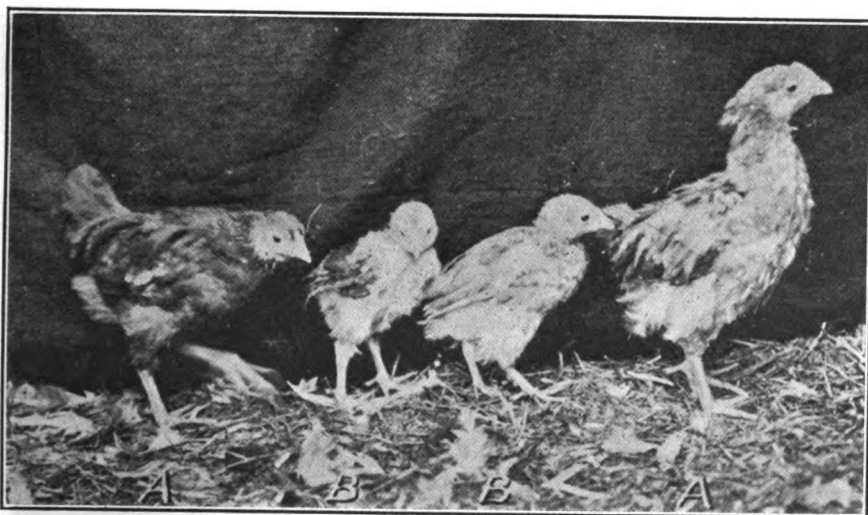


Fig. 10.

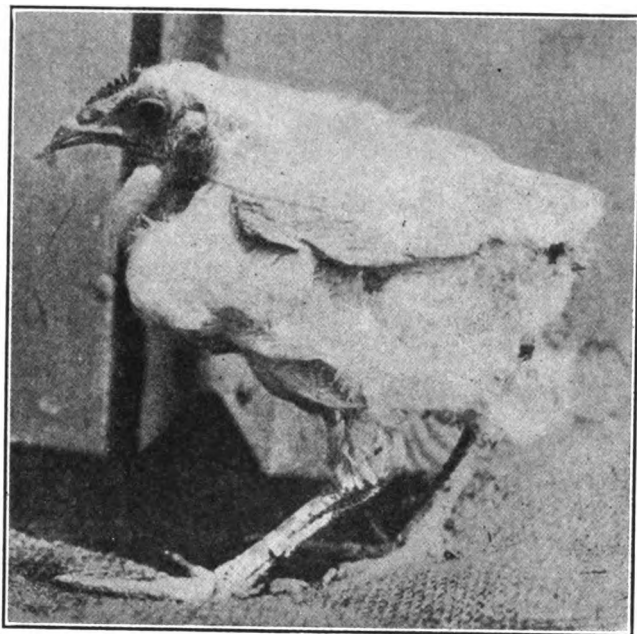


Fig. 11.



Fig. 12.

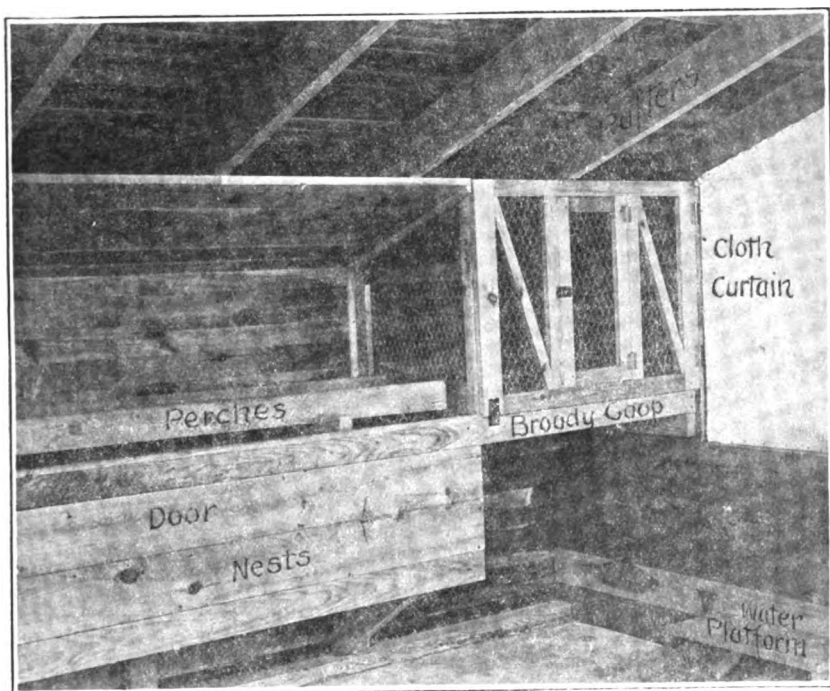


Fig. 13.

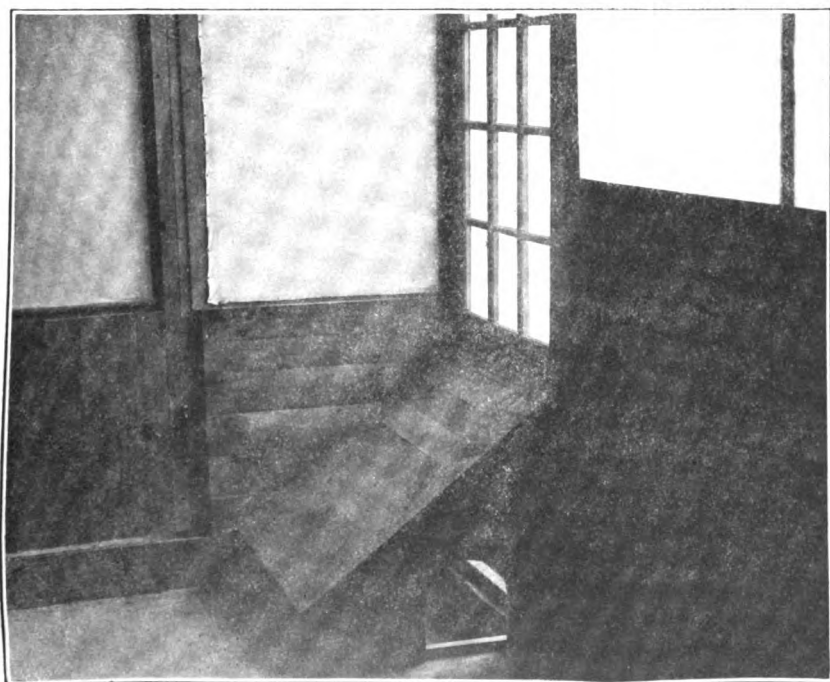


Fig. 14.

other. We have simply undone, by mating these fowls together, what it took some skillful breeders fifty years to accomplish, and we have not increased the vigor or health of the chickens as compared with the pure breds. The pure bred white leghorns of the third generation laid us last year 182 eggs apiece, an average for every pullet in the pen. The barred rocks averaged 129; the crosses averaged just about 133 to 150 apiece. We did get chickens in each of the crosses a little larger than the leghorn by means of the barred rock infusion of blood, but that is all we accomplished and that was not worth while because we had a better individual for meat purposes in the barred rock. Our experience for these pure breds at least, is to not cross them, but to keep the bred pure and get new life and vitality by getting new blood from somebody that has something better than we have ourselves, of the same variety.

One of the ways in which we can economize in the handling of poultry is in rearing the chickens in large numbers. I have here a slide (Fig. 16) that shows the nursery where the chickens are started. This is an excellent colony house 8 feet square. There is a big hover inside the house that will cover 250 to 300 chickens in a single flock. These houses are kept close together early in the spring and after the houses are all filled with the young chickens three or four weeks old, then the houses, chickens and all are moved out on the farm into the corn field or on the meadows where they can have free range. By this method we can reduce at least three-fourths of the labor of rearing chickens in large numbers.

Fig. 17 shows four methods by which these houses are moved. If we want to move the house only a few rods in the same field we just hitch the team to it and draw it along. If we are going to move it across the fields we run it upon a skid. If however the houses must be moved on the highway a mile or two, as we are obliged to do every year with the 25 houses because we have not enough money to build a double equipment on each farm, these houses are put upon wagons and moved out to the farm. It costs about \$1.50 apiece for moving the houses so far. The reason why it is necessary to move these houses back and forth to the farm is largely because we use the houses all winter for laying hens. These houses are big enough to hold 12 to 15 hens all winter. We find we can carry over 350 hens each winter more than we otherwise could because we use our brooding system the year round, brooding chickens in the spring and keeping laying hens all the winter.

Fig. 18 shows a closer view of the house. This is a later pattern.

Fig. 19 shows filling a tank with gasoline with a 5 gallon can. The burner under the house burns with a blue flame, and the heater box is made of galvanized iron and is fire proof. The heat pours down on the chickens and the fresh air comes in and spreads out over the chickens.

In Fig. 20 we see several thousand chickens on the range where they are reared. Last year with 4,000 chickens one man did all the work of brooding and handling these chickens. The only time he had help was occasionally for cleaning, once a week when the chickens were young. After that he did not have any help, and the latter part of the year he had time to do other things besides. This is because much of the work is done by horse power and because the chickens are

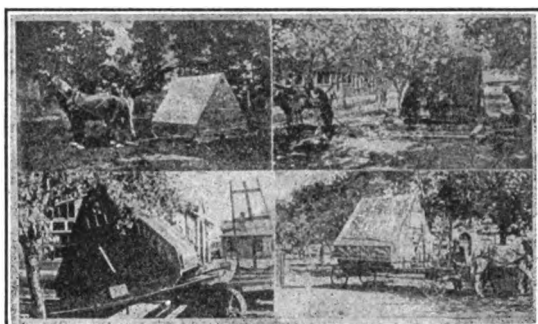


Fig. 17.

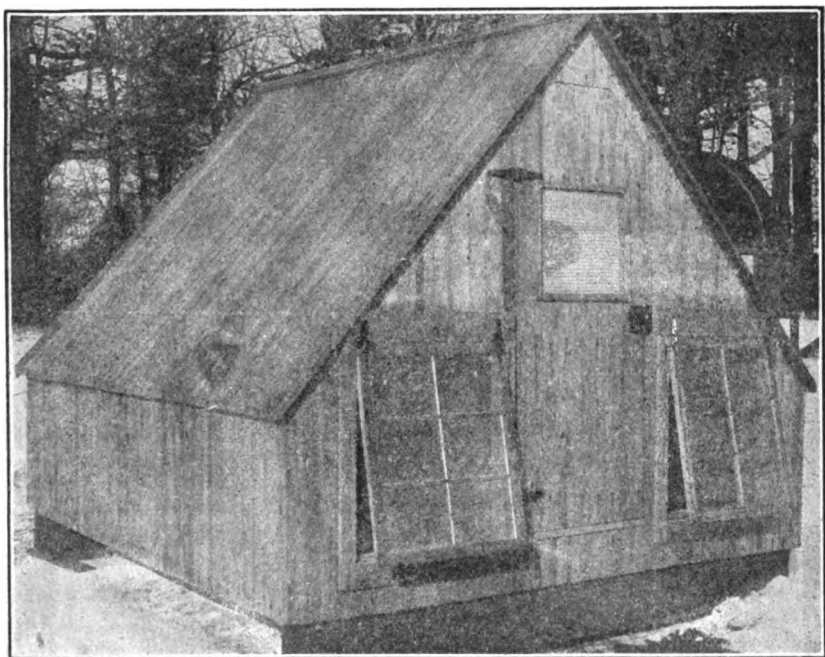


Fig. 18.

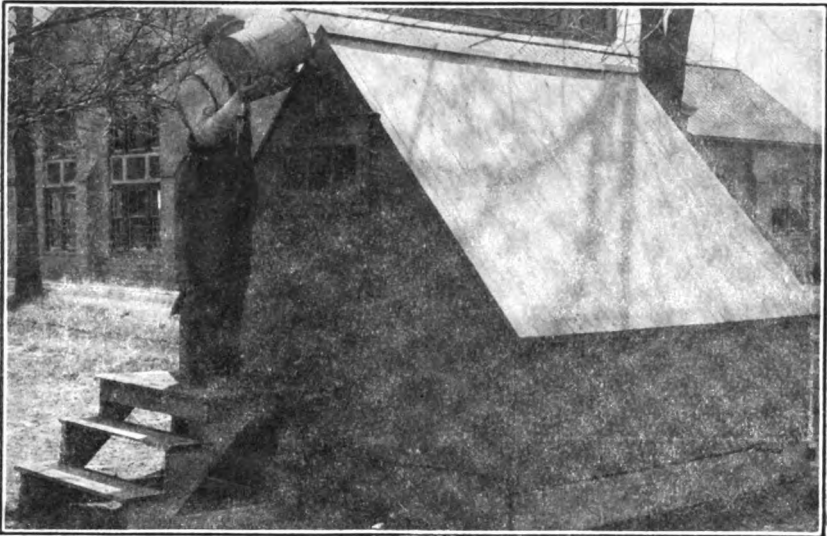


Fig. 19.

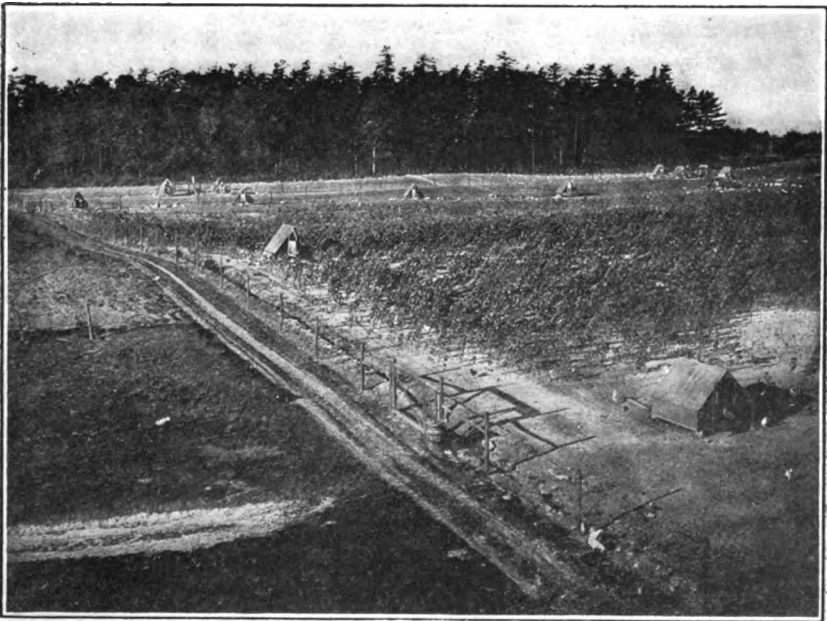


Fig. 20.

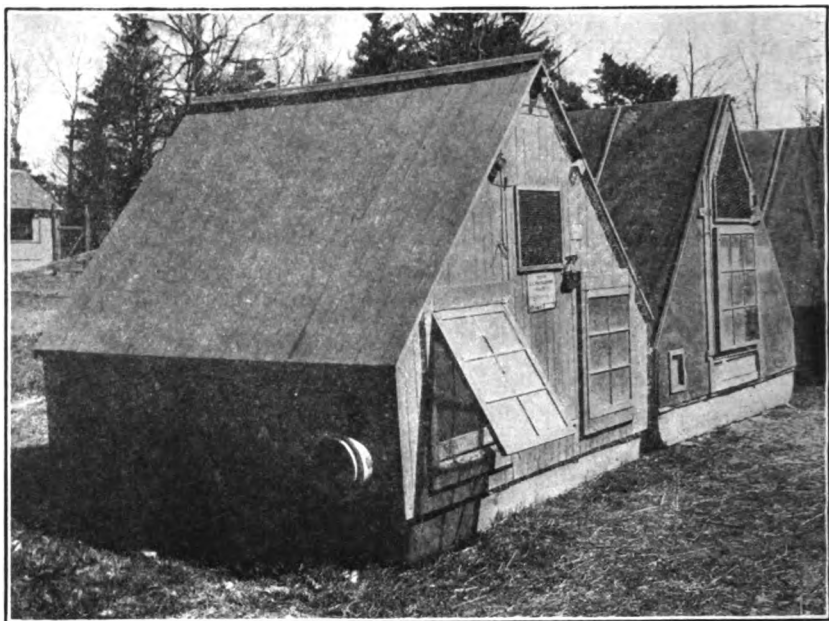


Fig. 21.



Fig 22.

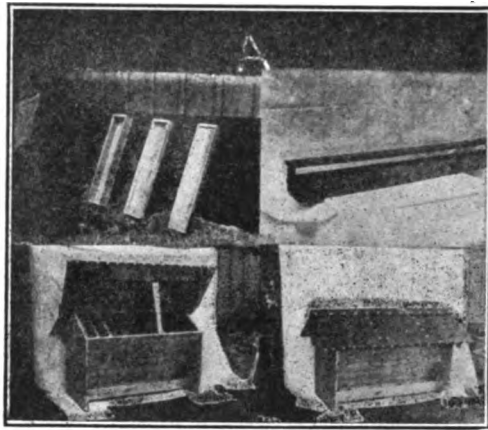


Fig. 23.

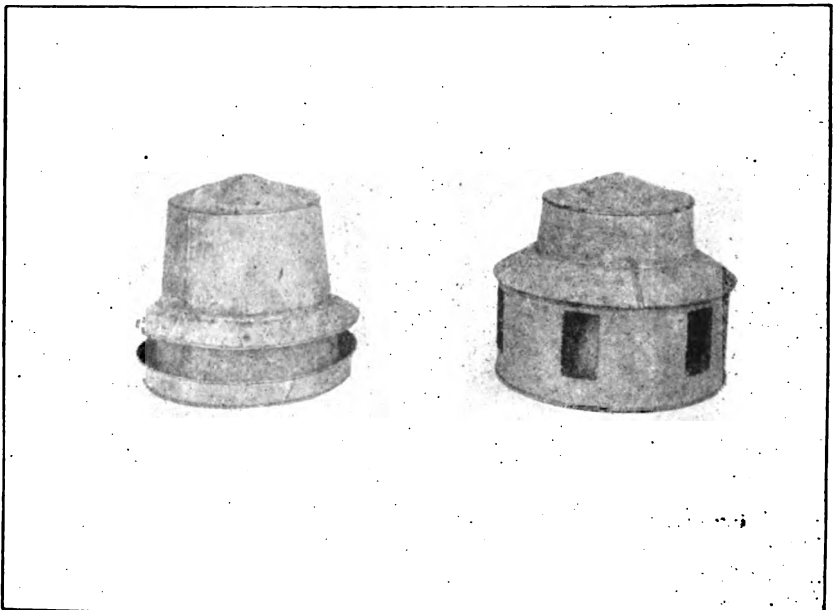


Fig. 24.

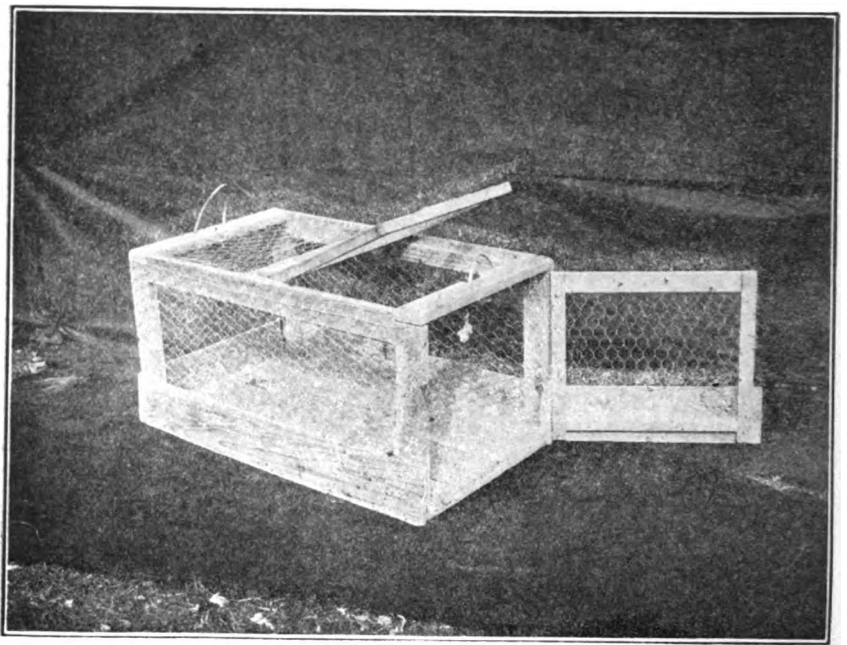


Fig. 25.



Fig. 26.



Fig. 27.

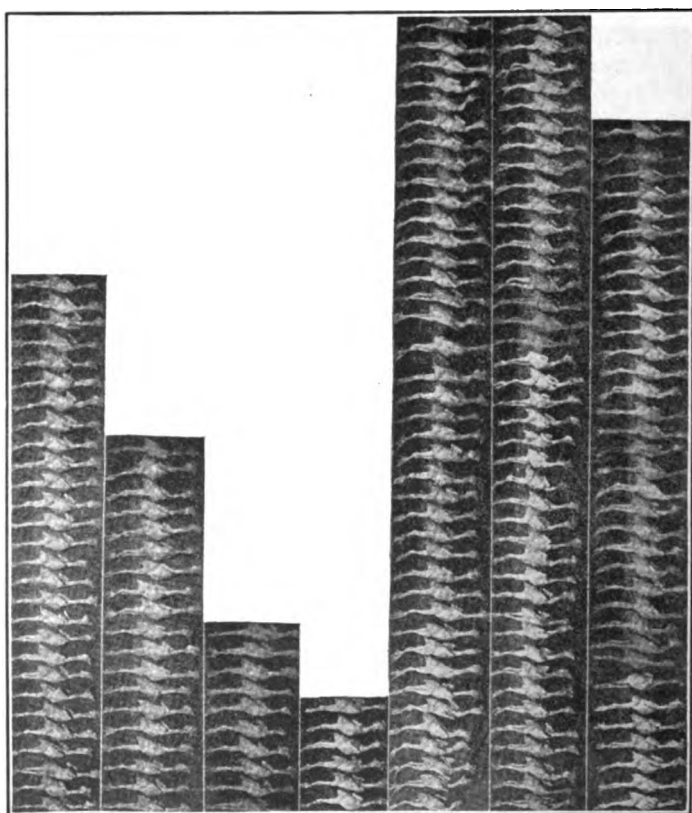


Fig. 28.

kept in large flocks. The houses are 100 to 50 feet apart, and the chickens running together and not fenced to separate except where they are of different ages. The illustration shows how these houses are scattered over 5 to 10 acres of land.

A simple device for connecting up several of the houses for winter use is shown in Fig. 21. You may notice that little galvanized collar at this point. It connects up three houses. The houses in this division have been removed to get photographs. The house in the centre of the group is where all the chickens roost, 45 of them; and this house to the right is where they go to eat, 45 of them; and the house to the left is the house where they go to lay, 45 of them; and then all run back and forward and go visiting when they please. Instead of having to take care of each house with 15 chickens, we take care of and clean only one house, gather the eggs in one and feed in one, a saving of 66 and two-thirds per cent. of the work in caring for the colony of 45 chickens as compared to keeping 15 in each house.

A corn field in which the chickens are running in the rape where the houses are so that the chickens will not destroy the corn as it comes up is shown in Fig. 22. The surplus chickens are removed when about 8 to 10 weeks old. We have about 200 or more chickens in each house when they get old enough to separate the sexes, which makes it desirable to prevent overcrowding.

Four different types of feeding troughs are shown in Fig. 23; one by which the very young chickens are fed; later a higher one; then a higher one still; and then later they are fed in this large one only once a day, and after eight weeks old they are fed in these out door hoppers you see here. After eight weeks old they are all fed by the hoppers by the man driving around and filling them once a week. It becomes an economical method.

Here is a sanitary water fountain (Fig. 24) by which chickens cannot soil their water. It is turned down side up to take the water out and wash it.

Fig. 25 is a catching box that ought to be on every chicken farm. You can drive the chickens in from this end and shut it up; and one man on each side of the box can carry a lot of chickens without danger of their smothering or having frightened them. It is a great labor saver to do this instead of frightening and running the chickens.

The low down wagon used to carry the water barrels is shown in Fig. 26. This is the wagon used to carry the feed, water, milk, &c and make the rounds in caring for the large flocks. To clean out the houses it is arranged as shown in Fig. 27. Two boys can go a mile and do all the work of feeding and watering 2,000 to 3,000 chickens in less than an hour.

In our experiment where we tried seven methods of feeding chickens we found a great difference in growth. You can get the details by sending for our bulletin No. 282. In Fig. 28 you will see the contrast in the size of the chickens and what it will mean if the feeding of chickens is properly done. We fed seven different kinds of rations. At nine weeks we killed all of the chickens that weighed one and one-fourth to one and one-half pounds as broilers and this is the result. You will notice on three rations there were a large number of chickens ready for killing at nine weeks; whereas, on other rations there were only six or seven, and on this ration where they had practically all

dry mash only a few more were ready; and where only cracked grain was fed only a few more. Later, at the time of killing, at ten weeks old you will notice these rations have the same proportion of chickens; and then at the final killing, eleven weeks old, almost no chickens were left to be killed from this flock and almost all the chickens or a very large proportion of them remained over to be killed at the end of the experiment. It was a very marked contrast due to the methods of feeding, and all the feeding was done by the same person.

Did you ever see chickens look like those in Fig. 29? Thousands and millions of chickens have been dying of the disease known as the white diarrhea. These chickens are suffering from that disease. Dr. Retgar, of the New Haven, Conn. Experiment Station, has found that this bacillary white diarrhea is a bacterial disease that is carried from one generation to the other through the ovary of the hen and the bacteria is left in the yoke of the egg so that the chicken is doomed to have the disease before hatched. If the chicken survives because it has a weak form of the disease it gives it to the next generation and so carries it on. It has been found also that the little chickens if they are not born with the disease in them may catch it up to the time they are four or five days old from other chickens that had it, but if not so doomed they will get through without trouble.

Fig. 30 shows what must be done as a means of prevention and that is thorough disinfection with 5 per cent. carbolic acid and 5 per cent. sulphuric acid and water 90 per cent. in order to be sure of killing the disease germs existing, and selecting the hens rigidly to find out that we do not have the disease on the place, and generally by keeping the chickens or hens away from where white diarrhea exists.

In Fig. 31 is shown a correlation between the number of eggs a hen will lay, the weight of the hen and amount of food that hen will consume. You will notice as these curves of food consumption drop the weight has gone down and the egg production down. As the feed consumed goes up, the weight goes up and egg production goes up; when the food consumption declines the egg production declines. These curves illustrate the most fundamental thing we know about feeding hens. It is this: that hens to lay well must have all they can eat of the right kind of food; and second, they must have that feed before they begin to lay. I met a man this winter who said his hens were not laying and he was not going to give them anything more to eat until they did. Any poultryman knows, who watches his hens, that they will begin to eat more for two or three weeks before they begin to lay because it takes that long for the eggs to develop; and this proves it. We have examined hundreds of hens and we find the rule holds good, that the hen will first begin increasing in the consumption of food, then increasing in her weight and then she will increase in egg production. The best condition for egg production is when a hen has surplus fat on the body. A poor hen cannot lay. They must have some surplus fat with which to make the first.

The hen shown in Fig. 32 is a good one. We discovered her in a moulting experiment. This hen was the last one of them to moult. She moulted on the 28th of November. She had laid 213 eggs in ten months and was the last hen to moult in a flock of over 200 and the best hen we had. In looking up the egg records of other hens we find that almost invariably the best laying hens we had are the ones that



Fig. 29.



Fig 30.

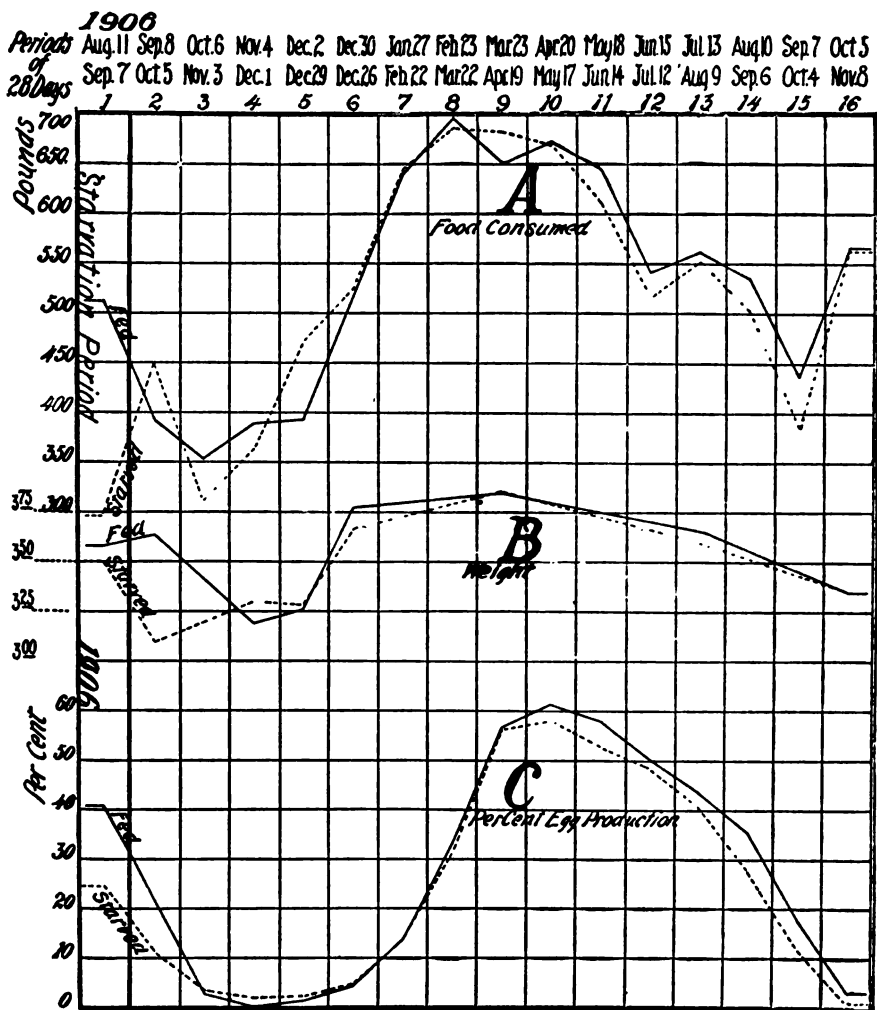


Fig. 31.—A comparison of starved and fed flocks, by periods of 28 days. A=Consumption of food. B=Weights of fowls in pounds. C=Per cent. production of eggs.

Fed flocks—Pens 8 (3 years old), 19 (2 years old) and 24 (1 year old).

Starved flocks—Pen 5 (3 years old), 22 (2 years old) and 25 (1 year old).

Note that the same general observations as to the increase or decrease in the food consumed, weight and percentage egg-production applies in the same manner as observed in Fig. 16.

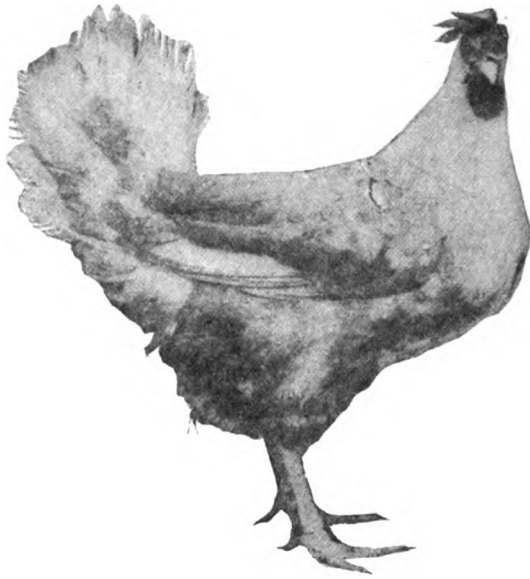


Fig. 32.

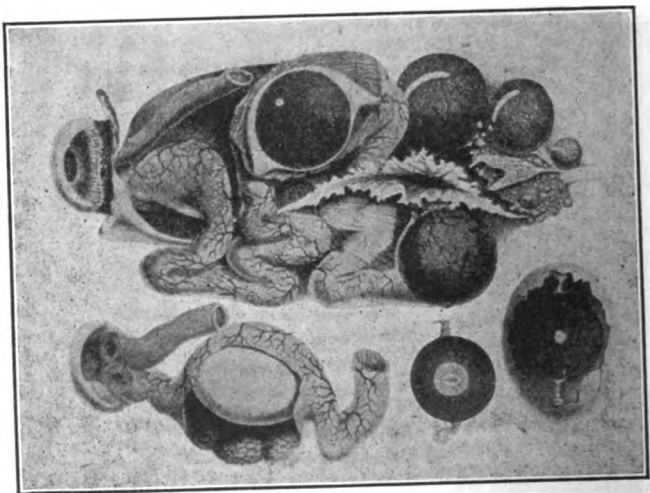


Fig. 33.

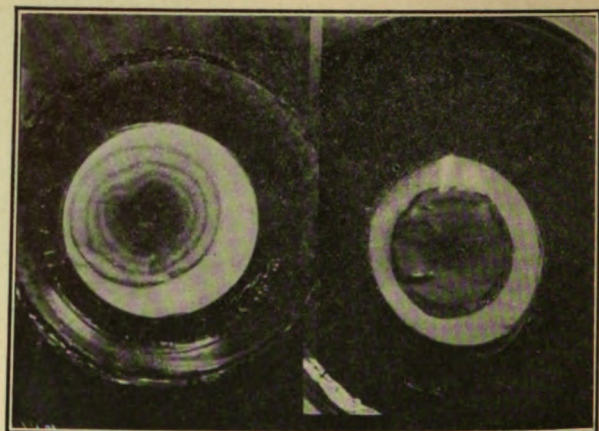


Fig. 34.



Fig. 35. ized by Google

Ways in which the Department of Poultry Husbandry is endeavoring to assist the Poultrymen of the State.

1. By conducting Experiments with Poultry.
Ask for the Poultry Bulletins.
2. By Correspondence.
Write to us.
3. By special instruction in regular and winter courses.
Send for announcement and take a course.
4. By showing visitors the Poultry Department.
Come see us.
5. By personal assistance in selecting breeding pens.
Perhaps we can help you.

The Department of Poultry Husbandry in Co-operation with the Extension Department.

6. By Poultry reading course lessons.
Send for them.
7. By Educational exhibits at the Fairs and Poultry Shows
Go look at one.
8. By Lectures and Demonstrations at Poultry Association meetings and Poultry Shows.
Arrange for a meeting.
9. By Lessons in Poultry Husbandry for Rural Schools.
Ask for Rural School Leaflets.
10. By co-operative experiments with poultry.
Try one.

Fig. 36.

moult last, and the poorest layers we had were the ones that moulted first. And here all these years you and I have been killing off every fall the best hens because we have picked out the early moulters because we thought by virtue of early moulting that they would be the best early winter layers. We have found also that not only do the last moulting hens lay most but they also take a shorter time to moult than the hens that moult early.

Fig. 33 is a picture showing the development of the egg, the ovary and oviduct. Right here in the ovary is where the disease of white diarrhea occurs. When the yolk breaks from the follicle and falls into the ovasack and comes down here and passes along where the albumen is deposited, the shell of the egg is laid on. A moment ago I stated the fact that the hen must have surplus fat in her body in order to lay well. This is the proof. The first part of the egg developed is this little yolk in the follicle, and there are many hundreds, 1,500 or more of these contained in the ovary along the spine. 64 per cent. and more of the dry matter in these yolks is fat and unless the hen has surplus fat in her body to develop the ovum, then she cannot lay, so that if we are going to get eggs we must give the hen an abundance of food so that she has the available nutrients to develop the ovum. We must have the right kind of material to manufacture the egg.

In Fig. 34 is shown one of the results of our experiment in which we undertook to find out what place inside of a hen. Governor Hoard says the darkest place in the world is the inside of a cow. I beg to differ with the Governor because just as dark a place is inside the hen.

A red dye due known as Soudan II was mixed with the food and absorbed into the body and in that way the dye affected the egg and here we can count up the red rings on the yolk and tell how many days it took to develop. We find it took ten days to fourteen days to develop from that small ovum up to the full size yolk of the egg. We found that another dye, Rhodamme red, does not affect the color of the fat of the egg but does color the white of the egg; hence we can tell what takes place in both the white and the yolk of the egg. When the egg is incubated and the chicken hatched we find this interesting thing takes place. In Fig. 35 is a picture of a little chicken hatched from an egg where the mother had been fed on Soudan III and you will notice that the chicken has manufactured the fat of the yoke of the egg over into the fat of its own body. That fat is ordinarily found on the inside of the chicken.

The next slide, Fig. 36, shows what can be done by the poultry departments of the agricultural colleges. It shows ten ways of helping the poultrymen of the State by conducting experiments with poultry, through correspondence, by showing the poultry department, by a poultry reading source, by educational exhibits, lectures, &c., at fairs, and by lectures and demonstrations at poultry shows, by poultry lessons for rural schools. These and many other things a poultry department in the State Agricultural College can do.

A few slides more, because the time is nearly up, I will throw on the screen to show the way in which this matter can be brought to the attention of the people. Fig. 37 is the lantern slide exhibit holding about 150 lantern slides which we used at the New York State Fair, where the people can stand and look at the slides with the illuminated back and read the inscription under them.

Fig. 38 shows another portion of the same educational exhibit in the same building, in which there are models of poultry houses and appliances and photographs showing the results of experiments with poultry.

Fig. 39 shows a new departure. Swarms of people passed through the exhibit in a large tent at the State Fair. This was to find out whether or not the people were interested enough in poultry to witness the demonstrations when there was horse racing and balloon ascensions and all sorts of other things going on around. And yet those who were there certified to the fact that every one of the four demonstrations held each day the seats were almost always occupied and many times the attendance filled the tent standing room. So that it was a pronounced success and shows that the people of the country are hungry and thirsty for knowledge regarding the methods of handling poultry.

Fig. 40 gives a view inside the tent showing the assistant giving a demonstration how to kill and pick poultry.

There was also shown an egg grading device by which eggs can be graded and which also shows what the value of these eggs are if they are produced of the right quality. There are 30 dozen eggs there to be put into nine grades, large, medium and small, and each of these groups divided into three grades as to color, white, brown and mixed. The average prices given by the best dealers in New York for each grade of eggs, and the value of the eggs according to the grades is shown. We can tell exactly and quickly what any case of eggs is worth. We find a difference in the New York City market usually of five to twelve cents a dozen between the pure white eggs and the mixed colored eggs of the same weight, and sometimes a difference of twenty cents or more between eggs of the fancy large white and the common or small eggs. It pays to produce the right kind of eggs. I am certain that we know how to produce eggs of better quality and also how to breed hens to produce more eggs. There are a few things we can do in selecting hens to produce more eggs. There a few things we can do in selecting hens for breeders to increase egg production. (1) Select our hens for constitutional vigor. (2) Take hens that moult late because they are the ones that are generally the heaviest producers. (3) Watch the pullets of the same age and see which ones begin to lay first and they usually are found to be the hens that in the long run will lay the largest number of eggs. (4) The color of a fowl's shanks may indicate her laying capacity. The hens in the fall of the year just before they begin to moult that have pale shanks are likely to be heavy layers. We find that it is almost invariably the case with the yellow shank breeds that if you find a fowl with good color in the shanks she is not a good layer. (5) In addition to that we may consider the body of the fowl as indicating prolificacy. There is such a thing as the egg type when you once come to know it, but it is not a certain indication.

Before closing this lecture I ought to bring to your attention the fact that the amount of money that is being spent by the agricultural colleges for dairying and horticulture, and other branches of agriculture, is entirely out of proportion to the amount of money given to poultry. This chart (Fig. 41) shows the result of a census taken by the American Poultry Association to learn the amount of money spent

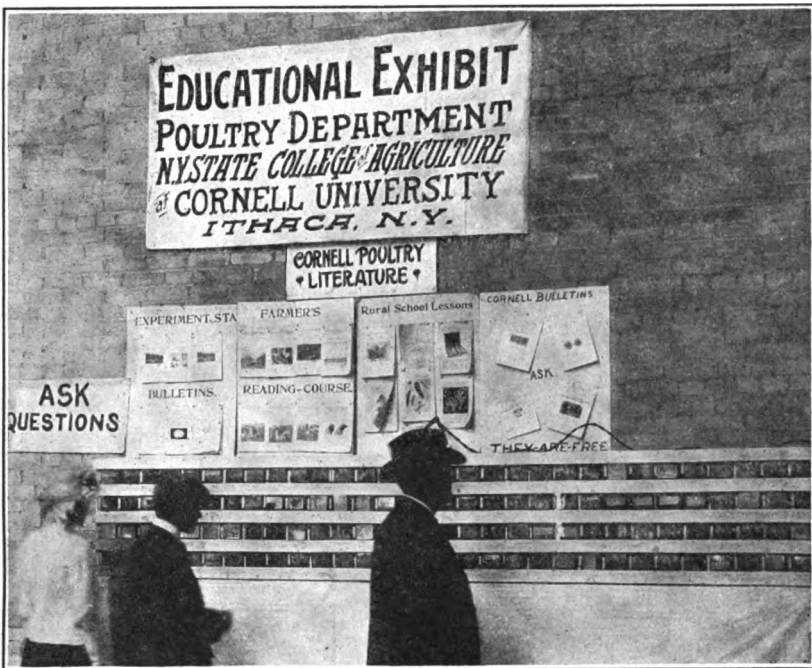


Fig. 37.

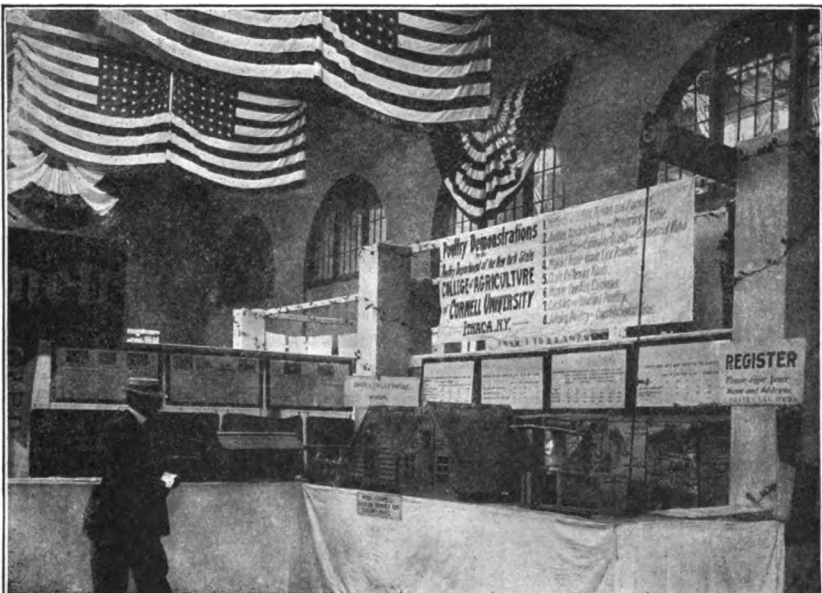


Fig. 38.

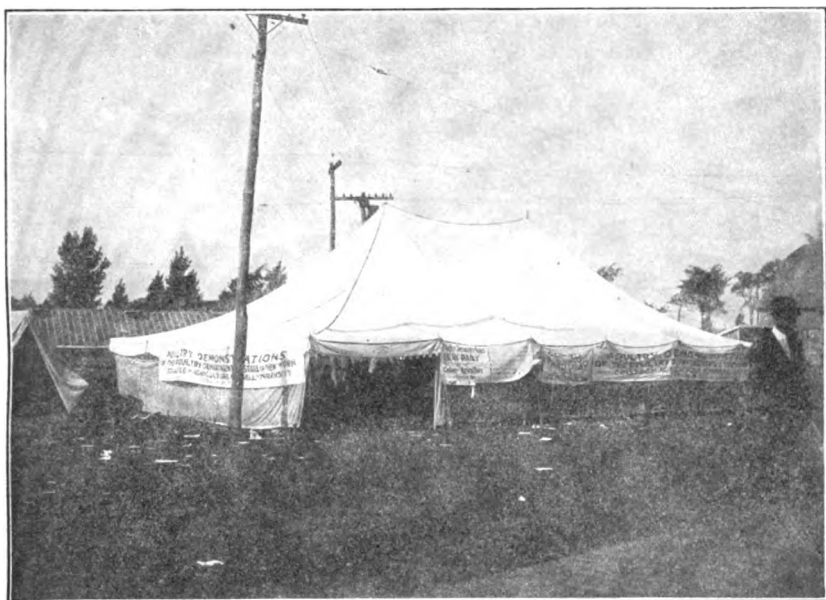


Fig. 39.

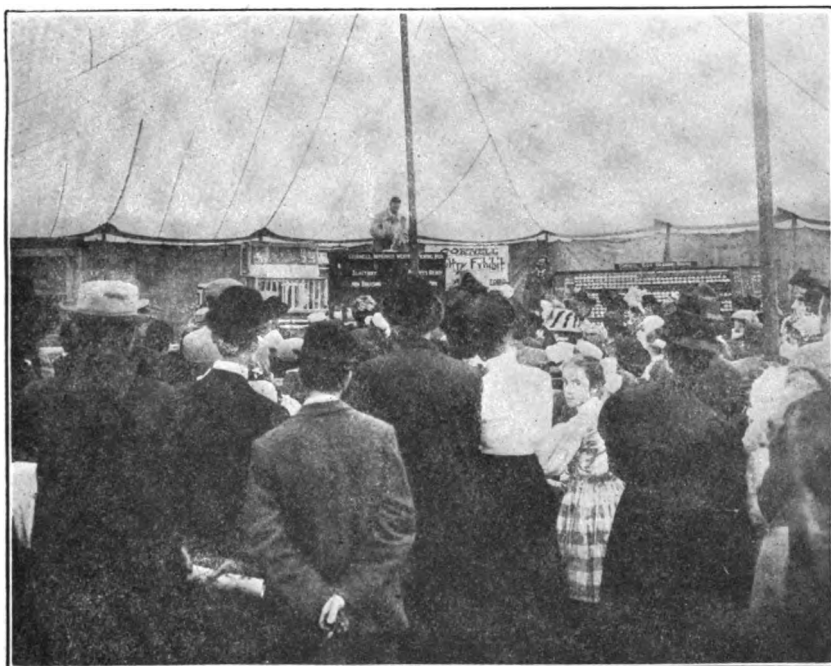


Fig. 40.

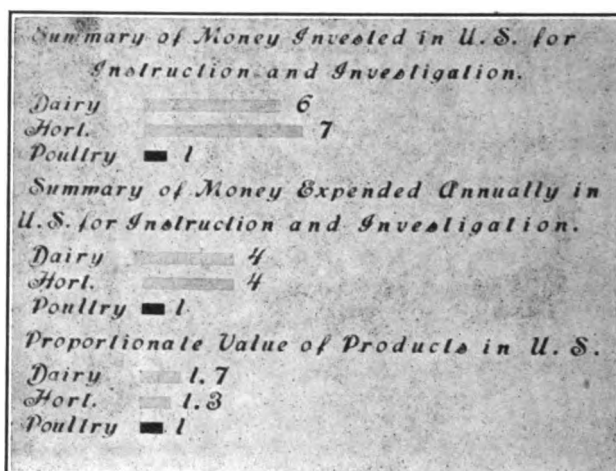


Fig. 41.

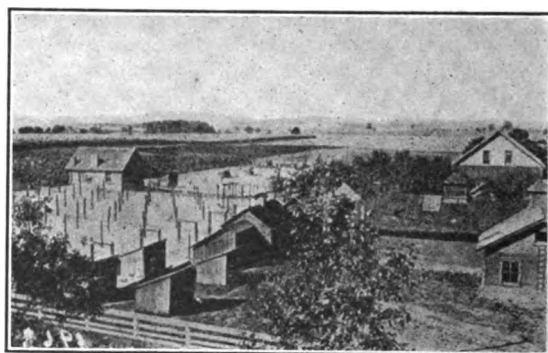


Fig. 42.

for dairying, horticulture and poultry in the agricultural colleges and experiment stations in Canada and the United States. You will notice that for every dollar spent for instruction and investigation and permanent investment in poultry husbandry in the United States and Canada there are six dollars spent for dairying and seven dollars spent for horticulture; and of all this amount of money that is expended annually for every one dollar for poultry there are four dollars for dairying and four dollars for horticulture. However, when you come to get the actual proportionate value of the products produced by poultry, by horticulture and dairying, and by horticulture, according to the census of ten years ago, we find that for every one dollar in value of poultry products produced there are only one and three-tenths dollars in horticulture and one and seven-tenths of a dollar in dairying.

The last slide (Fig. 42) shows a picture in your own State. There is a picture of the poultry department of your own State College of Agriculture, a department where under Prof. Homer Jackson good work is being done with facilities that are wholly inadequate to the poultry interests of this great State. Dean Hunt, I know personally, is thoroughly interested in the development of that department. When I was there a number of years ago he said: "Whenever we can get the appropriation to build the buildings and find the man"—he did not have Jackson then—"to take care of this department as it ought to be, there are twenty acres of as nice land as can be found in the State of Pennsylvania that will be turned over to the use of the poultry department."

The slides show views of the boys in the winter courses making chicken coops, building colony houses, judging poultry and other pictures to show the dozens of ways in which they are trying to teach the latest and best methods that will help the poultry of the State.

I feel that in this great State of Pennsylvania, which is one of the richest and one of the best agricultural States in the Union, and in which poultry husbandry is one of the chief agricultural resources, with the ability and the courage and the loyalty of the poultrymen of the State and the efforts of your poultry association through the able leadership of the President, Mr. W. Theodore Wittman, who is chairman of this meeting, with the assistance of the State Board of Agriculture and Farmers' Institutes and all these other educational agencies, that the State of Pennsylvania is not going to take a position in the rear rank, but is going to measure up to the responsibility and take the position and place it should occupy in the front rank of the states. (Applause).

The CHAIRMAN: If the members or anybody desires to ask Prof. Rice any questions, now is the time?

A Member: We have trouble with gapes in chickens. How can we avoid it and is there any cure? Will spraying the ground prevent it?

PROF. RICE: No; I think not satisfactorily. The best thing that I have found is turpentine administered to the throat wind pipe with a soft feather. That will loosen some of them. But the killing of the parasite in the ground by spraying is not likely to be effective and

economical. The free use of lime, cultivation of the soil, will help. The little parasite lives in the soil and in worms in the soil from generation to generation, especially upon the clay soils rather than the sandy soils. The only thing to do is to try to rear the chickens on new land. I don't know a thing can be done more easily than to change the habit of having the chickens reared on the same land each year. They should be moved to some other place every year not only to get rid of the gapes but all other infection. Our chicken houses are moved every spring seventy-five feet or more from the spot where they were before. It does not take much time and saves a lot of trouble and loss.

A Member: We have many railroad men in our community, along the main line of the Pennsylvania Railroad, that only have small lots and they can not go out into the field. Is there anything to spray the ground with that will destroy the mites in the soil?

PROF. RICE: Personally I have never sprayed the ground or undertook to eradicate with anything other than lime. I think the spray would have to go in deep in order to kill all the parasites and of course that would kill the grass. That is a pretty drastic measure but I suspect that something of that kind can be done, though I would think it would be very dangerous business to apply anything that strong to the ground and allow the chicks to run on it. I know of a man who sprayed the soil with "sheep dip," but I cannot vouch for the results.

A Member: What is the cause of the eggs sticking in the hen's body so she can't lay?

PROF. RICE: The hen does not have any power over the development of the egg. She can hold the egg for several days after it is developed and the shell is on; but if anything happens by rough usage or the shell is crushed and she cannot deposit it or if she catches cold or is improperly fed that may cause a drying up of the secretions. There are a lot of things that can happen that may stop secretions so that the egg is held there and she cannot lay it. Other eggs will come down and develop. I found a hen that when I cut her open showed that seven eggs had come down and had been forced into one solid mass in the abdomen. When you see a hen affected that way—you can tell it by the way she stands and strains—simply use some sweet oil and very carefully relieve the hen. Very often you will find hens shaking with convulsions or paralyzed in every muscle, even to the extent of fainting away so one would think they were dead, when nothing is the matter except that the egg is too large or the secretions are dried up, and the egg being pressed against the organs of locomotion the hen is paralyzed for the time. Use a little sweet oil and the egg will be laid and the hen will be all right. It is a case of being on the spot and attending to these little things immediately that often makes the difference between success and failure. Then hen's temperature normally is 105 degrees to 106 degrees and you can see that a fever heat several degrees higher could easily cause congestion and cooks the eggs.

A Member: What is the cause of chickens all at once just dropping over dead, especially young chickens?

PROF. RICE: I don't know. It is pretty hard to be sure of what the trouble would be. I should suspect there might be a case of "heart failure." That is always a safe guess when you don't know. Certain kinds of poisoning act quickly.

A Member: Not poison. Now and then a heavy young chicken possibly three-fourths grown and often when grown drops over dead?

PROF. RICE: I do not know what the trouble would be.

MR. BARNITZ: Give us your opinion on the intensive systems as applied to the farmer, as to whether it would pay?

PROF. RICE: Well now, I will tell you. I want to be as square to any system as I can. I know there are some persons that are succeeding with the intensive method and know them personally. To the person who has only a small amount of land I say make the best use of what you have if you can take the time to give attention and see that the principles of the cold brooder congested methods are carried out to the letter; that is to say, that you have the right proportion of chickens within a given space, to keep the heat in and are careful in feeding, and adapt these to the changes in the weather which occur through the hatching season, you may rear good chickens. But my experience is that it takes too much time and detail, labor and personal attention with so many small individuals, and the difficulty and responsibility involved when many chickens are reared you can see readily that the number of hens or chickens that any one can take care of is limited. The tendency of modern poultry husbandry is to get away from details and little flocks. I know perfectly well that if a person wants to get the largest egg yield possible from a given number of hens that if he keeps them in flocks of five or six he will be more likely to get maximum results than if he keeps them in flocks of 100 or more. It is a question whether you should not try to make a little sacrifice in the rate of production for the sake of keeping more hens and doing more business, which in the end may mean large gross profits. I know that in our own case this last year, keeping our hens in flocks of from 12 to 40 we find that we are getting just as good results in bigger flocks as smaller. The results have been exceptionally good. We have one hen this last year that laid 258 eggs and another 253. The best 15 hens we have averaged 236; and one flock has laid 182 apiece.

A Member: What breed were they?

PROF. RICE: These happen to be white leghorns. We keep mostly white leghorns because the New York market calls for the white egg.

A Member: How long do you keep good layers before you kill them.

PROF. RICE: My opinion is that it is a crime to kill a hen that lays 200 eggs the first year or anywhere near that. I wish I had about thirty minutes to talk along this line. We have been asking more of

the modern hen than she can stand and as a result we have all sorts of digestive troubles and breaking down of the constitution; hence the importance to-day to grow a strong hen that will stand up under reasonable production for two to three years, not simply to lay a lot of eggs the first year and die in her next. It is a good thing to be well born whether a hen or a human, and the hen has just as much right to be well born as a human. Hens are more reliable for breeding than pullets. They never lay as many eggs early in the winter as do the pullets. They are then fresh and strong and also give larger eggs. We know that big eggs give big chickens and so have that much start on the next generation. If you are shutting your hens up in the fall of the year and keeping them there all the winter through on the theory that because they are shut up they are off the snow and therefore necessarily give better results, you are making a mistake. Two years ago we tried an experiment. We started to find out what the effect would be on retarding our hens for breeders by letting them run out all winter long as compared to their sisters that are kept shut up. What do you expect we found? Instead of their laying less eggs they averaged fifteen to seventeen eggs apiece more than the hens that were shut up, and they were feed just alike by the same person. We have repeated that experiment this year with the same results.

MR. WITTMAN: How do you know how many eggs these hens lay?

PROF. RICE: We have 25 pens of trap-nested hens. We have been trap-nesting for several years. Complete records are kept every day and figured up at the end of the week. I have right in my pocket the data for all of these pens. We must have records to show what happened to chickens and eggs three or four generations back if we are to secure data that is worth while.

A Member: Is that worth while?

PROF. RICE: You never can get at the roots of things until you get the facts down in black and white. We have been guessing at things too long in the chicken business.

A Member: Could a farmer have the trap-nests?

PROF. RICE: No sir; it costs over 50c per year per hen just to keep the records. It is worth while for the experiment station. That is the business of the experiment station. It is infinitely cheaper for the State to hire a few men to find these things out than for 100,000 people to find it out for themselves.

MR. RODGERS: In the church papers and magazines that Philo system has been advertised extensively. Do you know anything about that?

PROF. RICE: As I just said in regard to that matter of rearing small flocks as compared with large ones, I do not hesitate to say that the tendency of modern poultry husbandry is to give the hens a wide

range and let them run in the fields and also to raise chickens out in the fields, and if they are allowed to run out in the crops they will make the land better, the trees better and if they are out on the meadows or pastures they will make the meadows better.

It is infinitely more economical to rear 4,000 chickens in flocks of 200 to 300 out in the fields and do the work by horse power and hopper methods than it is to raise 25 in a bunch by hand.

A Member: Will they improve the market crop?

PROF. RICE: If the crops and chickens are made to match properly, yes. For 20 years I have had the experience of growing chickens just that way. I can show you the pictures giving the results of what the effect is on plum, apple and pear orchards and show you similar results on corn fields. There is no place on earth so good and so fine for chickens as right out in the shade of the corn field, if the chickens are taken out there from the nursery when several weeks old. They should be kept up near the house for a few weeks. It gives the corn a chance to get up about a foot high. You must provide a roadway in front of the houses to leave water and feed once a week. This space can be sown to rape when the corn is planted and the chickens don't bother the corn to amount to anything. One year we had 2,500 chickens, about twenty houses right in a row on the edge of a corn field and they were there all through the season. They ate off the first rows of corn and the rest of the field was benefitted rather than injured. This could have been prevented by sowing dwarf Essex rape.

The CHAIRMAN: I am sure that this discussion is very interesting, but it is time to go on with the balance of the program for the evening.

The next item on the program is another illustrated lecture, on "Farm Management" by Prof. D. A. Brodie, Acting Agriculturist, Bureau of Plant Industry, Dept. of Agriculture, Washington, D. C. Prof. Brodie could not be here but has sent us instead Mr. J. A. Billings, of the Bureau of Plant Industry, U. S. Department of Agriculture, who will speak to us on this subject.

I now have the pleasure of introducing to you Mr. Billings.

Mr. Billings then delivered his address as follows:

FARM MANAGEMENT.

By J. A. BILLINGS, U. S. Department of Agriculture, Washington, D. C.

The work of the Office of Farm Management of the U. S. Department of Agriculture, embraces a study of the underlying principles which affect the profits of the farm. In this work very little attention is given to the carrying on of experiments, in fact, the object is to apply the results obtained by State Experiment Stations to use the methods employed by the most successful farmers in different sections,

and outline the system of management best adapted for each particular section, after taking into consideration the local conditions, such as character of soils, location in regard to markets, and climatic or other changes which may affect the types of farming and cropping systems.

Farm Management differs from experiment station work in that it makes a study of the farm as a whole, that is, the organization of the farm in reference to the arrangement of fields, the location of buildings, the cropping system and rotation best suited for the maintenance of soil fertility, the distribution of labor on the farm, the amount of equipment necessary to operate the farm, and the proper system of keeping records and accounts in order to know what crops are the most profitable to grow, or what system of farming is best adapted under existing conditions. The agronomist tells us *how* to grow any particular crop, the preparation and cultivation of the soil, the use of manures and fertilizers to furnish plant food and maintain profitable yields of crops. The animal husbandman tells us *how* to feed and care for animals, the dairyman tells us *how* to handle the dairy products, but the farm management man first of all studies the question *what* is the best type of farming which is best adapted for his particular farm. After deciding what crops to grow and the acreage of each; what arrangement of the fields for the most economical handling of labor and equipment; what cropping system which will be the most profitable for the type of farming to be followed; what kind of animals and the number of each; what kind and amount of farm equipment which is best adapted for the particular kind of farming which is to be followed, and this takes into consideration the buildings which are best adapted for this purpose, the kind and number of farm implements, machinery, stock, etc.; what amount and the best distribution of labor and what cost of production for the different farm crops or products and the probable net income which will be derived from the farm. In other words, farm management answers the question *what* or *whether*, while agronomy, animal industry, etc., usually answers the question *how*, as applied to the farm.

The work of farm management is to make a study of the conditions of every particular locality in order to study the problems in that region, and where necessary, co-operative work is arranged, in order to carry out this investigation.

The arrangement of this discourse will be taken up in the same logical order as we make a study of any particular farm with reference to establishing a better system of farming for more profitable returns. This is given to you as a guide to enable each farmer to make a study of his own farm in the same way and to think out solutions for the many problems which every farmer has to meet. In order to do this, therefore, the first question to decide is the best type of farming which can be followed with profit, whether a livestock, grass or grain, fruit, market gardening type of farming, or any combination of each. After deciding this question, it is necessary to satisfy conditions. This question will cover the number of work stock, such as horses and mules, and the number of cattle.

THE FARM PLAN.

If livestock or dairy farming is to be followed, then it is particularly necessary to estimate the number of dairy cows which can be

kept with profit on the farm. In order to do this, each farmer must figure out the amount of forage crops or grain necessary to feed each animal, and first of all one must decide on the ration for each kind of animal. For example,—suppose we have a problem to work out the best plan for a dairy farm. There are several feeding systems which can be followed, such as pasture in summer with no silage, pasture with silage, soiling crops without silage, soiling crops with silage, or silage for twelve months. These feeding systems may be more or less combined. It will first be necessary to find out the number of days or periods as for example, the number of days that silage is fed or the period of pasture, estimating the pounds of each material given during this period, for adult animals, for yearlings, for calves and for work stock. Then calculate the total amount of the different feeds necessary for the entire year. It will also be necessary to estimate the proportion of yearlings and calves to adult animals. As a general thing, we find that the average farmer will keep about one-half as many young stock, both yearlings and calves, as adult animals. In other words, in order to maintain the herd, we assume that there will be one-fourth as many yearlings as there are cows and one-fourth as many calves as cows, and in estimating the feed for each cow and corresponding young stock, calculate the amount of feed, both forage and grain, for one cow for the entire year and add to that one-fourth of the amount of feed necessary to support one yearling and one-fourth of the amount of feed necessary to support one calf.

After finding out the tons of feed of the different food materials necessary for one cow and corresponding young, find the acreage or the fraction of an acre necessary. Assume the average yield of farm crops, then divide the amount of each feed found for one cow and corresponding young stock by the yield per acre, which will give the acreage necessary. After determining the acreage of available land which can be used for farm crops or pasture, subtract from this acreage the acreage necessary for the work stock, and divide the remainder by the acreage necessary for one cow and corresponding young, which will give you the number of cows which can be kept upon the farm if the whole area is devoted for growing forage for the stock, if grain or other money crops not used for feed are grown, then the acreage of these crops must be deducted with the acreage for the work stock before we can determine the number of dairy cows which can be profitably kept.

In order to illustrate the establishment of a cropping system, an 80 acre farm is assumed of which 72 acres is available for crops or for pasture. We will suppose that 72 acres can be divided into six fields of 12 acres each for convenience of rotation. We will assume that the yield of farm crops per acre is as follows:

Yield of Farm Crops per Acre.

Corn, ...	60 bu.	Clover or mixed hay, ...	2 tons.
Oats, ...	40 bu.	Soiling corn, ...	10 tons.
Wheat, ...	50 bu.	Silage corn, ...	13 tons.
Potatoes, ...	150 bu.	Alfalfa (3 cuttings), ...	4 tons.
Soy beans, ...	20 bu.	Canada peas and oats, ...	2 tons.
		(hay)	
		Cowpea hay, ...	1½ tons.

Several rotations may be established on such a farm in order to satisfy conditions, but some of them, however, will be of greater advantage in maintaining the fertility and keeping up the humus contents of the soil. An outline of some of these rotations, with the approximate number of work stock, dairy cows and young stock, is as follows:

Rotation I. 1. Corn. 2. Corn, 6 a. Oats, 6 a. 3. Wheat. 4. Clover and timothy. 5. Timothy and pasture. 6. Pasture.	Pasture: No Silage. Animals Kept: 3 horses. 1 bull. 10 cows. 2 yearlings. 3 calves.
Rotation I. 1. Corn. Oats, 4 a. 2. Silage corn, 4 a. Corn for ears, 4 a. 3. Wheat. 4. Clover. 5. Timothy. 6. Pasture.	Pasture: Silage. Animals Kept: 3 horses. 1 bull. 10 cows. 2 yearlings. 3 calves.

Rotation I.		Solling: No Silage.		When Fed.
		Solling Crops.	Acres.	
1. Corn.		Bye, -----	1½	
2. Corn.		Wheat, vetch & crimson clover, -----	1	May 13 to 24.
3. Solling crops, 6½ a.		Red clover, -----	1	May 25 to June 5.
Oats, 6½ a.		Peas and oats, -----	2	June 6 to 31.
4. Wheat.		Early corn, -----	2	July 1 to 21.
5. Clover.		Cowpeas & Kaffir corn or sorghum, -----	1½	July 22 to August 11.
6. Timothy.		Late corn, -----	1	August 11 to September 4.
Animals Kept:		Cowpeas, -----	2	September 5 to October 1.
4 horses.				
1 bull.				
16 cows.				
4 yearlings.				
4 calves.				

Rotation I. 1. Corn. 2. Silage corn, 5 acres. Corn for grain, 7 acres. 3. Solling crops, 6½ acres. Oats, 6½ acres. 4. Wheat. 5. Clover. 6. Timothy.	Solling: Silage. Animals Kept: 4 horses. 1 bull. 18 cows. 4 yearlings. 5 calves.
Rotation I. 1. Corn. 2. Corn for grain, 6 a. Corn for silage, 6 a. 3. Oats. 4. Wheat. 5. Clover. 6. Timothy.	Silage 12 Months: No Pasture. Animals Kept: 4 horses. 1 bull. 14 cows. 3 yearlings. 4 calves.

Rotation II.

1. Corn.
2. Soybeans for seed.
3. Cowpeas for hay.
3. Wheat.
4. Hay.
5. Hay.
6. Pasture.

Rotation III.

1. Corn.
2. Soybeans for seed.
3. Cowpeas for hay.
3. Potatoes.
4. Hay.
5. Hay.
6. Pasture.

Rotation IV.

1. Corn.
2. Silage corn, 9 a.
3. Corn (grain).
3. Potatoes.
4. Alfalfa.
5. Alfalfa.
6. Alfalfa.

Silage for 12 Months.

No Grain Purchased:

Animals Kept:

- 4 horses.
- 1 bull.
- 18 cows.
- 9 young cattle.

Grain Purchased:

Animals Kept:

- 4 horses.
- 2 bulls.
- 42 cows.
- 21 young cattle.

Rotation V.

A three year rotation, 72 acres divided into 24-acre fields.

- | | | |
|----------|---------------------------------|------------|
| 1. Corn. | 2. Corn, oats or soiling crops. | 3. Clover. |
|----------|---------------------------------|------------|

Pasture; No Silage:

Corn for grain, 24 acres; oats, 24 acres; clover hay, 12 acres; and clover pasture, 12 acres.

Pasture; Soiling:

Corn for grain, 24 acres; oats, 18 acres; soiling crops, 6 acres; and clover hay, 24 acres.

Silage 12 Months:

Corn for grain, 24 acres; corn for silage, 10 acres; oats, 14 acres; and clover hay, 24 acres.

Rotation VI.

Six Year Period—36 Acres.

Three Year Rotation—36 Acres.

Alfalfa continuously for five years.
The fifth year put 12 acres to corn.
The sixth year, 24 acres to corn.
The seventh year, the three year rotation established.

1st.	Corn	Corn	Clover
2nd.	Corn	Clover	Corn
3rd.	Clover	Corn	Corn
4th.	Corn	Corn	Canada peas & oats
5th.	Corn	Peas & oats	Alfalfa
6th.	Peas & oats	Alfalfa	Alfalfa
7th.	Alfalfa	Alfalfa	Alfalfa

Rotation VII.

1	2	3	4	5	6
Alfalfa*	Corn	Corn	Wheat	Clover	Timothy
Alfalfa	Corn	Wheat	Clover	Timothy	Corn
Alfalfa	Wheat	Clover	Timothy	Corn	Corn
Alfalfa	Clover	Timothy	Corn	Corn	Wheat
Alfalfa	(Timothy, peas & oats, potatoes).	Corn	Corn	Wheat	Clover
Corn	Alfalfa	Corn	Wheat	Clover	Timothy

*The alfalfa field may be permanent as long as profitable then brought into the regular rotation and a new field devoted to this crop.

Some other Rotations Followed:

1. Corn.	1. Potatoes.	1. Wheat.
2. Wheat.	2. Corn.	2. Corn.
3. Clover.	3. Potatoes.	3. Canada peas and oats or potatoes.
4. Wheat.	4. Wheat.	4. Clover.
5. Clover.	5. Clover.	5. Timothy.
	6. Timothy.	6. Timothy.

Cover Crops for Green Manure:

Rotation I.

At last cultivation of corn.

Rotation II.

At last cultivation of corn.

After each crop of potatoes.

Rotation III.

At last cultivation of corn.

In *Rotation I*, where the pasture system is followed, the number of animals which can be kept profitably on the farm will be governed by the acreage available for pasture, and in this case I have assumed that there is no permanent pasture, except a small paddock near the buildings, but that the pasture will come into rotation. There will also be sold wheat, hay, or other crops in some cases over and above what is necessary for feed for the animals. The grass incomes from this 80-acre farm for the different feeding systems under this rotation vary but little, at the average farm prices, and will be approximately from \$1,900 to \$2,500. From this must be deducted the expense for labor, farm equipment, interest and depreciation, fertilizers, etc., although for a live stock type of farming very little fertilizer will be necessary if the rotation is arranged as suggested.

In *Rotation II* soy beans and cowpeas have been introduced as a crop to follow corn, the object being chiefly to introduce a leguminous crop to improve the soil texture preceding the wheat and to much better maintain the fertility of the soil. Soy beans may be introduced as a profitable crop in Pennsylvania, either for hay or for seed. The

latter can be ground and fed to the farm animals or may be sold in market, as there is demand for soy bean seed. Cowpeas may also be grown for hay in the more southern parts of the State, but this crop is not as profitable a seed crop as the soy beans. The feeding value of soy bean meal may be shown by the chemical analysis and digestibility experiments which give the total digestible protein in soy bean meal about that of linseed meal. In many parts of the State of Pennsylvania this crop may profitably be substituted for oats in the farm rotation.

Rotation III varies from *Rotation II* only in the substitution of potatoes in place of wheat. This is applicable only on those soils which are better suited for growing potatoes. The total income from *Rotation III* will be somewhat greater, varying from \$2,500 to \$3,100 annually, but on the other hand, there will be a greater expense for labor in growing the potato crop and probably an additional expense of \$175 to \$200 for commercial fertilizers.

Rotation IV introduces alfalfa, a very profitable crop for the dairy farmer, and this crop can be profitably grown in a great many parts of the State. Alfalfa may be grown permanently for five or more years, before reseeded or rotating, or alfalfa may be placed in a rotation for three to five years, as suggested. The great advantage of this rotation is its influence in improving the soil, as alfalfa is a soil builder, while the grasses and cereals are soil exhausters.

Rotation IV, in which potatoes enter, gives a very desirable crop preceding alfalfa, but in order to seed to alfalfa after potatoes, it will be necessary to grow early potatoes, which can be marketed about August 1 and which will enable the alfalfa to be sown before September 1. If potatoes are not profitable, in any section, Canada peas and oats may be substituted, mowed for hay the latter part of June or early in July, and the field quickly plowed, or perhaps simply disked and allowed to lie fallow with weekly cultivations until the latter part of August, when alfalfa may be sown. Under some conditions, such as on limestone soils that have considerable clay, it may be necessary to fallow the land from early spring until July, then seed to alfalfa.

Alfalfa is a profitable crop for feeding livestock or for market. At present the price for alfalfa hay is fully as high or higher than for good timothy hay and as a rule, under favorable climatic conditions, we can depend upon at least four tons of marketable alfalfa hay per acre. Furthermore, this hay has a much greater feeding value as far as protein is concerned, than grasses or even clover and nearly equals the feeding value of wheat bran.

The gross income from this rotation, basing alfalfa at market price, is greater than for any other rotation which can be followed on the farm, and varies from \$4,000 to \$5,700, depending on the number of animals which are kept and the amount of grain which is purchased. An interesting fact is that 42 cows can be kept when the necessary grain feed is purchased, but the net income, after deducting the cost of grain and labor, from 42 cows is but little greater than where 18 cows are kept and all the feed is grown on the farm.

Rotation V, which is a three year rotation, gives clover once in three years and is therefore a good cropping system for maintaining the humus of the soil. The income, however, from this rotation is slightly different from *Rotation I*.

In *Rotation VI* it is assumed that the 72 acres is divided into two fields and that 36 acres of alfalfa may be grown continuously for five years, while the other half of the farm is devoted to a three year rotation. The advantage of this system is that where alfalfa can be grown successfully it may be far more profitable to let this field stand permanently as long as possible before reseeding, and when it is necessary to change, the half of the farm devoted to rotation can gradually be seeded to alfalfa and rotation established on the alfalfa area.

Rotation VII is best suited to a farmer who desires to keep permanently as long as possible only a small field of alfalfa. When it is advisable to change, any other field may be seeded to alfalfa, as suggested in the outline, and the area devoted to alfalfa be placed in the regular rotation.

With all of these rotations it is very desirable to grow cover crops, which can be used for plowing down in the spring as green manure, seeded at the last cultivation of corn or after potatoes, when potatoes is to be followed by some crop which will be planted the following spring. For this purpose, we suggest the planting of hairy vetch, especially on soils of sandy nature, but it is more advisable to sow with the vetch some rye, wheat, crimson clover, or a combination of each, which will give a support to the vetch and more vegetable matter to turn under. We suggest where rye and vetch or wheat and vetch are sowed to use a half bushel to three pecks of rye or wheat with 18 to 25 pounds of vetch. Several successful farmers are using 25 pounds of vetch with five to six pounds of crimson clover per acre, and some are planting vetch alone at the rate of 40 pounds per acre. One-half bushel of rye or wheat with 18 to 20 pounds of vetch and 5 to 6 pounds of crimson clover, in the regions where crimson clover can be grown, is a very desirable mixture.

FARM EQUIPMENT.

The kind, amount and efficiency of farm equipment is a matter which is receiving considerable study by our office. Very little attention has been given hitherto to the study of farm equipment, especially in regard to the requirements on farms of different areas and different types of farming. Dairy buildings, and especially the stables for dairy cows, has received considerable attention in the last few years and the Dairy Division of this Department is recommending plans for sanitary stables. However, my observation of many dairy buildings shows that on many farms which are producing high grade milk, a great many of the stables are very expensively equipped, whereas on other farms equally good milk is being produced from more simple construction of stables. I have in mind a farm in Susquehanna county which is sending to New York milk which receives nearly as high a score in cleanliness as any other milk shipped to the city, yet the buildings are very simple. The production of clean milk perhaps depends largely upon the individuality of the man as upon the equipment. Clean milk may be produced under very simple though sanitary conditions, if great care is used in the care and handling of the product from the time the milk is drawn until it reaches the consumer.

The style of farm buildings and stables in different regions varies widely. Pennsylvania has a peculiar type of structure of barn which is seldom found in other states. These barns have the stables in the

basements, which are usually dark, poorly ventilated, and unsanitary. Such stables, however, can be easily modified, giving more healthful conditions for animals, by building a one-story ell with concrete floors and very simple sanitary interior fittings. Such a stable has recently been erected by the U. S. Indian School at Carlisle, Pennsylvania, from plans by this Department.

Another style of barn, very applicable to regions where considerable grain is grown, is a covered yard type of stable with storage above, and an arrangement for stanchioning cows at the time of feeding. This covered yard may be entirely enclosed, with side windows, and a sanitary milking stable addition adjoining this building in which the milk may be produced as cleanly as from any other system. A stable of this kind was built a few years ago near Columbus, Ohio. It was large enough to accommodate 60 cows by dividing the covered yard into two yards holding thirty cows each. The silage and all roughage is fed in this covered yard and the grain feed may be fed here or may be fed in the milking stable during the time of milking. The advantage of this system is that it enables the farmer to utilize a great deal of the straw, and overcomes the necessity of cleaning stables daily. Where plenty of bedding is used, the cows are usually as clean as ordinarily found in the other type of stable, even where considerable care is given to grooming and cleanliness. In such a system it is necessary to give 80 to 100 square feet of space per animal. If the storage above the covered yard is arranged for hay in the center and straw in the wings, then the amount of labor in caring for the animals can be reduced to a minimum. This system ought to appeal to farmers in parts of Pennsylvania, especially in Lancaster county, where the rotations call for considerable acreage of wheat and where, as a usual thing, a great many steers are fattened for market.

In making a study of the equipment on the farm, each owner must carefully consider principally the type of farming and the simplest requirements for the storage and handling of his crops. A truck or fruit farmer may not require near as much expenditure in buildings as a hay, grain, or dairy farmer. The problems of working out standards for equipment for all different types of farming is receiving special attention in this office.

Another problem which each farmer should carefully consider is the amount of equipment in farm implements and machinery. As stated for farm buildings, many farms are over-equipped in this respect, while many others do not have the amount of equipment necessary to handle the farm economically. The question of the most efficient tillage implements is also of vital importance, and a knowledge of the best methods in preparing land and cultivation of crops is very essential, in order to plan on the amount of farm equipment necessary. The farm roller is an implement which probably is necessary on every farm, but very little attention has been given to what kind of a roller is most efficient. The efficiency of an implement to compact the soil was brought to my attention the past year, in those regions which suffer the most from drought. In New Jersey it is customary to seed down to clover and timothy or alfalfa the latter part of August, after harvesting a potato crop or some early crop, which allows the field to be cleared in August. Many fields of clover and timothy and some plantings of alfalfa this past year were not a

success, due probably to the inefficient work of the ordinary farm roller, and under such conditions it may be necessary to have an implement with a corrugated surface or with a series of convex disks set closely together in order to compact the subsurface of the soil. On several fields where potatoes had been harvested and the vines had been raked off with the ordinary horse rake, even where this failed was rolled after preparing by a disk harrow, the seed failed to germinate, which shows where the wheels of the horse rake compacted the soil, which shows conclusively that under dry conditions the ordinary plain roller superficially compacts the surface. There are several implements being placed upon the market, which compact the subsurface and which should receive the attention of farmers.

Many implements for cultivation are now placed upon the market which are equipped with blades or knives for cutting the surface without going very deeply into the soil. Such implements are very efficient for the later cultivations of crops in that they simply loosen the top soil, prevent the cutting off of feeding roots, prevent the evaporation of soil moisture from a lower depth and provides a dust mulch to conserve the moisture.

The Office of Farm Management also makes a study of the efficiency of farm implements, with a view to economy of labor. It is often an important question to what extent a farmer may employ larger implements which require a greater number of horses and thereby decreasing the amount of man labor. In many sections of the East it may be entirely practical to use large power machinery, especially the traction plow, and the traction engine for other farm operations. The traction plow is already in operation in New Jersey and Pennsylvania, and where the fields are comparatively large and level, especially where the fields are rectangular, with a long course before is is necessary to turn, such expenditure may be economy. There are many farms which could be arranged for the practical use of a traction plow by rearranging the fields.

The problem of farm equipment I consider has not been solved as yet, by any means, and the farmers should assist the Department in giving their inventories of farm tools, in order that this office may secure data enough to establish some standard for farms of different areas and types of farming.

RECORDS AND ACCOUNTS.

One of the most important farm management problems is the establishment of some simple system of records and accounts, which will enable the farmer to know more definitely the cost of production of farm products, and the distribution of labor on the farm, as influenced by his farm conditions. One of the important questions of the day among business men is the establishment of scientific management, which will give greater efficiency. The study of efficiency in operating large plants has been perfected in many places so that the manufacturer is realizing greater profits. The efficiency and distribution of farm labor is a problem also which is one of the most important on the farm. The farmer should know the cost of feeding and caring for the different animals; he should know the cost of labor, both horse and man labor for the different crops; he should know the production and cost of production of dairy products, in order to have

an accurate knowledge of the profits and losses on the farm. Many farmers are beginning to realize the necessity of keeping careful records and are establishing systems which will give them this data. In most cases, however, this is done on large farm propositions where the records and accounts are kept by a bookkeeper hired for that purpose. The small farmer, however, needs this information just as much, and a simple system of keeping his accounts may be devised, which, while not absolutely accurate, will give enough of this information to determine what profits are being made on the farm.

The Office of Farm Management has for some time been keeping records on a number of farms, doing the tabulation in the office, by a system of daily record blanks, especially designed for getting the information which this office needs. The summaries of the yearly records on many of these farms are extremely interesting and suggest many things of importance in their business management.

In order to show the importance of this work and what a careful keeping of farm records actually means, the following tabulations of the cost of growing corn, the maintenance of an orchard and handling the apple crop, is given.

TABLE I.
Compiled by Office of Farm Management, U. S. Department of Agriculture. Wisconsin Farm.
 1908. Crop Corn—Ensilage. 15.38. A. Field "a-1."

Total.				Per Acre.		Remarks.
Dates.	Man hours.	Horse hours.	Cost.	Man hours.	Horse hours.	Cost.
Care seed corn, ---	491	2943	93.58	3.90	17.22	.427
Plowing, 5 inches deep, ---	583	3543	38.95	5.74	3.97	2.457
Drainage, ---	203	441	7.30	1.33	2.83	.475
Discing, ---	143	441	4.41	.96	1.43	.417
Planting, ---	104	32	8.60	.68	2.44	.224
Planting, ---	204	373	7.15	1.36	2.86	.463
Drainage, ---	203	44	7.10	1.33	2.86	.462
Replanting, ---	102	1.43	7.58	1.43	2.96	.068
Outfitting, ---	923	453	7.58	1.43	2.96	.463
1st time E&W, ---	473	584	13.31	3.11	3.87	.801
2nd time E&W, ---	373	55	9.17	1.79	3.58	.601
3rd time E&W, ---	44	794	13.84	2.85	5.19	.900
4th time E&W, ---	344	58	10.40	2.24	3.77	.576
Hoing, ---	5923	79.06	79.06	38.55	7.77	6.139
Cutting, ---	1194	15.94	15.94	7.77	24.90	1.066
Hauling and silaging, ---	427	383	95.23	27.76	6.192	6.192
Total labor cost, ---	1,5554	1,139	\$321.30	101.15	74.07	\$80.898
Seed—Silver King, ---			10.70			.009
Equipment, ---			26.89			1.743
Taxes, ---			7.69			.600
Interest, ---			76.90			5.000
Total cost, ---			\$443.48			\$23.897
						214 lbs. @ 5c. lb.

YIELDS.

192 loads silage @ \$3.00, -----	=	\$576.00
32 shocks fodder corn @ .75 c., -----	=	24.00
34 bu. seed corn @ \$3.00, -----	=	10.00
Total, -----		\$610.50

SUMMARY.

	Total.	Per Acre.
Income, -----	\$610.50	\$39.70
Cost, -----	443.48	28.84
Profit, -----	\$167.02	\$10.86

Rates per hour: Man hours, 13 1-3 c.; horse hours, 10 c.

TABLE II.
Compiled by Office of Farm Management, U. S. Department of Agriculture.. N. Y. Farm.
 1910. Crop: Orchard, 4½ Acres. Field "H."

Dates.	Total.			Per Acre.		
	Man hours.	Horse hours.	Cost.	Man hours.	Horse hours.	Cost.
3/1-28, Scraping trees, -----	25		\$5.00	5.56		\$1.12
3/28-4/2, Pruning trees, -----	100		20.00	22.22		4.44
4/4-9, Spraying, -----	238		8.68	6.39		1.91
4/16-20, Piling and drawing brush, -----	16		3.90	3.55		.87
4/22-23, Plowing, -----	27	54	10.80	6.00	12.00	2.40
5/2-6, Spraying, -----	13	84	3.45	2.89	1.89	.77
5/9, Harrowing, -----	4	8	1.60	.89	1.78	.35
5/16-17, Harrowing, -----	4	8	1.60	.89	1.78	.35
5/24-25, Spraying, -----	27½	34	8.90	6.11	7.56	1.97
5/25-6/8, Harrowing, -----	14	9	1.80	1.40	2.00	.40
5/31-6/4, Spraying, -----	20½	11	5.20	4.56	2.44	1.16
6/7, Cultivating, -----	3	6	1.30	.87	1.33	.27
6/15-20, Spraying, -----	13	13	3.90	2.89	2.89	.87
6/24-7/13, Cultivating, -----	13	20	5.80	2.89	5.78	1.16
7/13, Sow clover, -----	1		.20	.22		.04
7/13, Drugging clover, -----	14	3	.60	.85	.67	.13
7/13, Rolling clover, -----	2	4	.80	.44	.89	.17
8/13, Thinning apples, -----	10		2.00	2.22		.44
10/3-17, Picking apples, -----	2394		99.90	66.66		13.30
10/4-17, Picking up and drying apples, -----	55	23	13.30	12.23	4.89	2.68
10/3-18, Drawing apples, -----	27½	61½	11.67	6.11	13.73	2.84
Total labor cost, -----	6892	304	\$169.54	154.69	67.82	\$37.67
Manure charge (50 per cent. of 1910 charge), -----			20.71			4.02
Spraying materials plus hauling, -----			15.80			3.51
Clover seed—½ bu. @ \$9.00, -----			4.50			1.00

Barrels—498 @ 35c. each, -----	170.80	-----	37.955
Equipment charge, -----	28.79	-----	6.895
Taxes, -----	8.15	-----	7.700
Interest, -----	31.50	-----	7.000
Total cost, -----	\$444.80	-----	\$98.854

YIELD.

498 bbls. apples @ \$2.50, ----- = \$1,220.00 108.4 bbls. per acre.
 Drying apples, ----- 100.00

Total, ----- \$1,320.00

SUMMARY.

	Total.	Per Acre.	Per Bbl.
Income, -----	\$1,320.00	\$238.530	\$2.71
Cost, -----	444.80	98.854	.91
Profit, -----	\$875.20	\$139.676	\$1.80

Assumed rates per hour: Man hours, 20 c.; horse hours, 10 c.

Some figures on the cost of feeding dairy cows for the production of milk are very interesting. The average cost of feeding and caring for an animal from its birth until it became an adult, which was about two years, secured by keeping accurate record of a dairy herd in Wisconsin, shows that under a very simple system of management the cost of feed and labor amounted to \$50.08. The cost of feed during this period was \$42.01. The cost of labor was \$8.07. The feed was charged at market prices, man labor at 12 cents per hour and horse labor at 10 cents per hour. The young stock were pastured for about three months during the summer, for which there was no labor charged. An interesting fact in connection with this is that for the first two months the cost of both feed and labor was the greatest of any part of this period. During the winter months it remained fairly uniform and was the lowest during the summer.

Another line of work which has received considerable attention in our office is what might be called conducting an agricultural survey. This is a canvass of all the farmers in a township and securing complete data on the incomes and expenses of the farm. In this work, attention was given to the early training and preparations for farm life and one of the most interesting deductions from farm surveys in New Hampshire is that the average net income from farmers which received a high school training was considerable above the income from farmers who only attended the district school.

The CHAIRMAN: Have you any questions you desire to ask on this subject?

A Member: Have you worked that system out practically?

MR. BILLINGS: Yes; it has worked out in several cases. I do not know of just that system in this State or New Jersey, but it has worked out in the West, I know positively in Oklahoma.

A Member: Do you know of a case where clover does not follow alfalfa?

MR. BILLINGS: Does not do well after alfalfa?

A Member: Yes sir.

MR. BILLINGS: No; I have not found any fields where clover is following alfalfa. Where alfalfa has proven profitable and successful to grow it has been kept down permanent and they have not reseeded to clover.

A Member: After we have had alfalfa for five years and have followed with the regular crop rotation this season we have put in clover. The other field is nicely set but the patch that was in alfalfa has hardly any clover. You can see the line.

MR. BILLINGS: It may be necessary to inoculate for your clover. I would want to study the problem a little before I can give you a definite answer.

A Member: The rest of the field is growing clover and the whole field did not grow clover before. It looks very much as though it was something that was not favorable to growing clover following alfalfa.

MR. BILLINGS: I would be glad to talk this over with you and perhaps we can study what the trouble is. I have not found any cases like it. I never found any place where alfalfa was followed with clover.

A Member: I see you have corn, oats and wheat once. Do you sow grass then where you sow alfalfa?

MR. BILLINGS: Will you kindly put in that slide again? I think I tried to show there that in order to change over the clover in this field what would follow is to be mostly grass. That would be plowed up early in the spring, preferably so, and planted to peas, oats or to potatoes, either one, early potatoes; then seeding down to alfalfa and it might be possible to turn under that timothy sod if he is going to try to reseed but I doubt the practicability of that. In fact, it is better to put on a cultivating crop one year. Potatoes we find is an excellent crop to reseed preceding alfalfa and in Jersey we have several cases where alfalfa has been grown after the early potatoes with marked success. I have just returned from a field over in the State of Jersey and in the three days I was there I saw between three and four acres of alfalfa and this alfalfa was planted in August after the early potatoes, without replowing, simply harrowing and seeding.

The CHAIRMAN: This closes our program for this evening. We will now adjourn to meet at 9.30 to-morrow morning when we have another interesting program.

Thursday Morning, May 25, 1911, 9.30 O'clock.

Mr. B. F. Killam in the Chair.

The CHAIRMAN: We will now proceed with the program. This should be one of the most interesting sessions. I do not see as many people here as yesterday afternoon, but let us give the instructors the best attention.

The first item on the program is "Needs of Rural Schools," by Miss Sara C. Lovejoy, of State College, Pa. It affords me pleasure to present Miss Lovejoy to you.

MISS LOVEJOY: Ladies and Gentlemen. It is a very good thing to be a lady this morning because the ladies come first, and I can say what I please and those who come after me will have to answer for it.

Miss Lovejoy then presented her address as follows:

THE NEEDS OF OUR RURAL SCHOOLS.

By MISS SARA C. LOVEJOY, *State College, Pa.*

The needs of our rural schools are fundamentally the same as those of all schools, based on the common object of all education. Every one who aspires to the name, "Educator," and even those of us who can claim no higher title than "teacher" are thinking some pet theory as to what education really is, but from the many definitions, as numerous as are the definers, we may select as one of the best that of a leading college president: "The object of all education," he says, "is to train men and women for intelligent citizenship." The schools of our rural communities should, therefore, fit the boys and girls for their duties as men and women. Are they doing this?

Before we can answer this question we must consider what these duties are for which training is needed. First for the home, the one institution of our land in which all the people share, and in the building of which every one has a part. We have long recognized that boys who were to become physicians, ministers, or engineers must be especially trained for their professions. It is time that people admitted that home-building is no less a profession than are these others and that they who are to administer the work of the household should be definitely trained.

In our rural districts, however, as in our cities, we do something besides live in homes. Their material needs must be supplied and that necessitates a directly lucrative occupation. Now the one business upon which all people, whether dwellers in the open country or in crowded cities depend is that carried on in our rural communities,—agriculture. Stop that, and how would the people of this land live? Financially, it is worth more in this State than are all the other occupations combined, including mining and the oil industry. Is it not a business, therefore, for which there should be definite preparation in the schools where the future farmers and farmers' wives are being trained for intelligent citizenship. How can agriculture develop, how can it keep the place it should hold, that of our foremost industry, unless the people who engage in it are as well-trained as are the people engaged in other occupations?

The reason, then, for the study of Home Economics and Agriculture in our rural schools is to increase the power of the rural districts by giving to the boys and girls such a thorough mastery of their business that they will realize its importance and will more readily remain on the farms. It must be recognized that one reason why young people are flocking to cities is that they feel that farming and house-keeping are drudgery and that there is no chance to "rise." There is always a chance to rise when one is studying his work and making it progressively better.

In addition to introducing these technical branches, our rural schools should also better relate their present courses of study to the facts and interests of daily life, so that education may not lead

away from the home, but toward it. A problem in arithmetic is of as great educational value when it deals with the division of the income of a family in such a way as to allow the proper proportion for food, for clothing and for housing, as when it deals with the proportionate amount of capital invested by the several partners of a business firm. Attention can be called to matters pertinent to the welfare of family and of livestock if other problems set the children to figuring the required amount of nitrogenous food in a balanced ration either for man or for beast. A geography lesson can be made interesting in itself and may be related to matters of daily life if, instead of being required to learn mere lists of exports, imports and agricultural products of China, Japan and other distant lands, the children are at the same time, given instruction as to the uses of some of these exports in our own households, for instance tea, coffee, rice and sugar; or if they taught something of the agricultural methods employed in other countries. This suggests that in raising the standard of our rural schools, we are not asked to put out of the curriculum the common branches which all recognize as necessary, in order to teach some subjects which many people feel are distinctly "new fangled" and unnecessary. On the contrary, the aim should be to co-ordinate all the work so that it shall be of the greatest practical value.

This is not the time or place to take up in further detail the courses of study. We can merely indicate in general the chief needs of our schools. Later speakers will present methods for instruction in agriculture. All that I can hope to do is to urge you most strongly to introduce into every school, courses in Domestic Science and kindred subjects. The first objection to this is that matters pertaining to the home can best be learned there. If cooking were all that is included in Home Economics, doubtless most mothers would claim the ability to teach their daughters, although many an experienced housekeeper is often forced to admit that luck rather than science guides her own cooking processes. Much more, however, is included and should be understood by every woman who has the responsibility of directing a household. She should know not merely how to cook, but how to combine foods into a properly balanced ration. This implies a knowledge of the needs of the body, and of the foods supplying these. The soil and the cattle on our farms require nitrogen and lime—so do human beings, but the amount needed by the latter is less generally understood. Moreover, a lack of any of the necessary food elements means a form of starvation, which cannot be prevented by an increased amount of another food element. Since a knowledge of these principles is essential to the complete well-being of our families, this should, very evidently be taught in our public schools if they are to train for intelligent citizenship.

The principles of hygiene and sanitation also belong in the curricula of our rural schools. We have a State law requiring that temperance be taught in all public schools. This is a wise step in freeing the country from a great evil. But one-half the cases of intemperance are caused by improper food. When the body is not properly nourished, a craving for some stimulant is created. Moreover, intemperance is not confined to excess in drink, indiscretion in eating cause many bodily ills. The pupils in our schools should, therefore, be taught the laws of health in regard to eating as well as to drinking.

A well organized crusade against tuberculosis is attracting the attention of people everywhere, and we welcome every effort put forth to stamp out this plague. Preventative work, however, is better than curative, and here again the school is the place for instruction. When school houses are properly built and cared for in regard to ventilation and sanitation, when the common drinking cup is banished, and the pupils are taught why clean houses, fresh air, pure water and clean bodies are necessary to good health then there will be less tuberculosis to fight. If only once a week definite instruction were given concerning the dangers lurking in the dust that clings to our clothing and furniture; in the air of a close room; in the cup passed from student to student; in the touch of a fly flitting from the filth of improperly cared for barns to the food on our tables, and in other matters vital to health, we could soon see a distinct rise in the standard of public health. It ought not to be necessary to emphasize the importance of these matters in rural communities where pure air, good water and proper sanitary conditions are so easily provided, but repeated experience proves that we who live in the country often disregard the laws of health more than do people in cities.

One reason why many people fail in agriculture is because they do not put it on a business basis. They do not know their exact capital invested, or the income derived therefrom, and cannot tell whether they are making money or losing, until too late they find out to their sorrow. For this reason every rural school should include in its instruction a business training, not the stenography and banking which are usually associated with that term, but a study of the finances of the farm and the farm home. If the merchant must know the proportion of his income which he should invest in advertising in new equipment or in enlarging his business, the farmer, no less, should know his financial status, and the farmers' wife should realize her responsibility since the expenditures for the home are largely under her direction. As has been said before, much of this may be introduced with the usual arithmetic and book-keeping taught in most schools. It is not a new subject, but a practical application of an accepted branch of common education.

So much can be done, then, by the progressive teacher whose desire is not so much to follow well-worn educational paths, as to adapt her instruction to the needs of present day life. This, however, is not enough. As we have seen, some definite technical work is needed for the future home-maker, and the problem of introducing the subject into rural schools becomes difficult. It seems to require special teachers and special equipment, impossibilities in communities where school taxes scarcely provide for the present inadequate facilities.

This condition of affairs emphasizes the need of consolidated rural schools. Why is it that Pennsylvania is so far behind other states in this matter? We look in vain through the pages of the report on Consolidated Rural Schools issued by the office of Experiment Stations and the Bureau of Statistics, for any mention of Pennsylvania. On the contrary, the shabby, isolated school buildings which we all know are a disgrace to this, one of the richest states of the Union. Better buildings, better school grounds, more adequately paid teachers, and then we shall have wider courses of study and a rising generation of more efficiently trained citizens. Concentration of capital, whether

in trusts, or in school management brings higher returns, and in the case of schools, the general public receives the benefit of these returns—it may not be out of place to quote from the report already referred to :—"The fusion of a number of small districts into a larger administrative unit furnishes a stable and extensive basis for financing the school and thereby makes for higher efficiency. An incentive is given to make permanent improvements to beautify the school grounds, secure modern sanitation, and provide ample school room equipment. Studies can be introduced which require specially trained teachers, such as agriculture, home economics, manual training, music, advantages almost unattainable in small district schools. These centrally located country-life schools, too, form convenient social centers for communities; local interests and activities affiliate with the schools, so that public use is frequently made of their commodious class rooms or auditoriums."

Pennsylvania should follow the example of her neighbor, Ohio, and of many western and southern states in this respect, but until she does, we must find a way of meeting existing conditions. The problem has been solved in Maryland and elsewhere by means of a special teacher of Home Economics, hired jointly by the several schools of one township or of adjoining townships. With a convenient traveling equipment she is able to go about spending one day, or part of a day, each week in a school. The equipment may include a denatured alcohol stove, if possible one supplied with a portable oven, a home-made fireless cooker, a small supply of cooking utensils; sauce-pans, measuring cups, mixing bowls, spoons, knives, baking pans, and other most necessary articles. This can be packed in a trunk or box and taken from place to place. The pupils in each school are instructed what supplies to provide for each lesson, and if the whole is arranged systematically, the work is most successful.

Better still is it to have a packing box equipment in each school house. The boys can be pressed into service to construct cupboards from packing boxes easily obtained, and the necessary utensils can be packed conveniently away between lessons. If the building is so arranged that a separate room can be provided, so much the better, but if not, a table at one end of the regular room must do. If a permanent one is not possible, one constructed by means of boards placed on wooden trestles, or on the desk tops will serve the purpose. Often the stove used for heating the room may be utilized for cooking.

The question naturally arises as to whether such work will not interfere with other classes in the same room. It need not, if discipline is properly maintained. Another question is regarding the cost of such an equipment. It can be provided according to its completeness, at from \$10 to \$100; I have seen a satisfactory one for less than \$30. If there is sufficient interest in the matter, donations of utensils and supplies by the people of the community often reduce the cost of equipment and maintenance.

The object of such a course in cooking and a study of food principles, as of all else included in the broad term Home Economics, is two-fold; to train efficient home makers, and to raise the standard in the home, so that the dignity and importance of household tasks may be better appreciated. We have false standards when we feel that person who works in a kitchen is performing service less worthy than the girl who manipulates a type-writer in an office.

A direct result of this course may be the solution of one of the serious problems of school life—the noon lunch. We nearly all recognize as injurious the cold luncheon, consisting often of a combination of indigestible food, served in an unappetizing manner. Nevertheless, it has seemed impossible to avoid this entirely. Even though we may choose more nutritious articles and see that they are packed so carefully as to be palatable when lunch time comes, still a cold mid-day meal is poor sustenance for growing children. With the introduction of cooking into our schools we may hope to improve conditions very materially. Each day the lunch brought from home may be augmented by some one hot, nutritious article served at a trifling cost. The planning may be done by the teacher, the work by the pupils, those only being allowed to help whose lessons are prepared. The ever useful fireless cooker is of assistance here as a means of cooking and keeping hot, cocoa, meat stew, beans, macaroni and cheese or other wholesome articles. Another bad feature of the usual school lunch, aside from its effect on health, is carelessness regarding table manners, and a general disregard of order. This also may, to a large extent be welcome if a more regular noon meal, served neatly indoors, takes the place of the contents of a lunch pail hastily devoured on the school house steps.

Some of you are ready to object that the school program is already over-crowded and that the introduction of subjects hitherto considered a part of home training will over-work both teachers and pupils. When a special teacher can be hired by several schools, no additional work need be put upon the regular teacher, and even if this is not possible, most teachers who have undertaken the work have found that the children enter into it with such zest, and return to their other studies with so much more enthusiasm that the strain of teaching seems less severe. Others will object that Home Economics is merely a fad. Is any subject a fad which helps people to live according to higher standards, by teaching them how to observe better the laws of health, how to be prudent in the use of time, strength and money, and by making a study of the home of supreme importance? You say that there is nothing to be learned in school about house-keeping and home-making, we immediately put these occupations upon a lower plane than others, since we admit that twentieth century methods are better than nineteenth for most things. Scientific methods are accepted in the business world, why not in the home?

If we are to have Home Economics permanently in our schools, we must of necessity have properly trained teachers, and here a more serious difficulty presents itself. However, with the required introduction of this work into Normal Schools, and with the course already established at the Pennsylvania State College, opportunities are being offered for their preparation. For these teachers in schools where no facilities for work are provided by the board of education, and where no regular courses can be taught, a beginning may be made through the noon lunch, which may develop later into a complete course. The summer course for teachers at the Pennsylvania State College, while it cannot give in six weeks a complete professional training in Home Economics, offers much that is valuable to those who wish to know how to start work through the lunch or in some other small way.

Let it not be thought that all the needs of our rural schools will be supplied by the introduction of Home Economics into the curriculum.

We need, as has already been stated before, a more liberal appropriation for school work making possible better buildings, more attractive grounds, more adequately paid and, consequently, better teachers and a closer co-operation between school and home. However, one very definite step toward some of these needed improvements will be taken when Home Economics and Agriculture are introduced into every rural school.

The CHAIRMAN: You have heard this subject treated. Are there any questions to be asked? The ladies must be interested. If there is no discussion we will go on with the next number on the program: "Some Lessons We Should Teach," by R. P. Kester, Gram-pian, Pa. Is Mr. Kester present?

DEPUTY SECRETARY MARTIN: Mr. Kester has been present at our sessions. I do not know the cause for his absence now.

MR. LIGHTY: Mr. Kester was called away and wanted to come back this morning. Possibly his train may not have arrived yet.

The CHAIRMAN: We will take up the next subject: "The Present Trend of Agricultural Education," by Prof. L. A. Clinton, Director Experiment Station, Storrs Station, Conn. Is Prof. Clinton here? He does not appear to be present now, so we will take up the fourth item on this morning's program: "Country Schools for Farm Life," by Prof. Thos. I. Mairs, State College, Pa.

I have the pleasure now of introducing to you Prof. Mairs.

PROF. MAIRS: Mr. Chairman, I am here. I was not expecting to be called upon so early on the program. I was thinking I would have Mr. Kester's talk and Prof. Clinton's address to use as the basis for my own talk this morning, but apparently I have got to begin at the beginning, or to start some talk of my own. Miss Lovejoy has very ably handled a part of the subject this morning, but the subject is such a wide one that it is impossible to cover it all in any one talk or two talks or any dozen talks.

Prof. Mairs then delivered his address as follows:

COUNTRY SCHOOLS FOR FARM LIFE.

By **PROF. THOS. I. MAIRS**, *State College, Pa.*

It is acknowledged by nearly all that the country schools are not serving their purpose so well as they once did. The object of all education is to adapt the pupil to his environment. As the environment changes the schools must change to meet it, if they are to do the

work for which they are intended. If our schools had been less efficient in the past there would be less difficulty to-day in adapting them to present needs. Some one has said "Man must be fluid, must be able to change, institutions are not fluid, they never change until forced to do so and then they fight to the death to maintain their dogmas." While this is to some extent true this very conservatism is one of the strong points of the public schools. It is well that they are not carried away by every dreamer with a freak educational system. Nevertheless certain changes, not reforms, are needed if the country schools are to adapt their pupils to farm life. By country schools we mean not only the one room country schools but the township high schools as well.

That it is the function of these schools to adapt their pupils for farm life should not be questioned. Practically all their pupils come from the farm and most of them will continue on the farm. Very few of them will attend any other school and must therefore get whatever education schools can give them in these schools. It should be the function of the schools to train the pupils for the conditions of tomorrow so far as they can be foreseen, but since the morrow cannot be seen let us train them for to-day rather than for yesterday.

The specific adverse criticisms made of the country schools are that they do not touch the heart of the community, that they are modeled too much after city schools, that they do not give enough useful knowledge, and that they are inclined to place the fitting of students to meet college entrance requirements ahead of training for life, that is they are inclined to sacrifice the interests of the majority for the benefit of the few. The reasons of these tendencies are far to seek but the remedy is not always so easy to apply. The leaders in education have not been workers in the rural schools and there has been a constant drainage of the best teachers from the country to the city schools and the professions on account of the better salaries. The country teachers have in general recognized the superiority of the city school and in seeking for improvement have naturally been led to copy. A great deal more thought has been given to the improvement of city schools for city environment because of the better organization and higher salaried men.

The public gives the teacher of the township schools more credit for fitting one student for college than for what he does for all the rest of the school. It is natural therefore that the teacher should give special attention to this one again. The teacher is perhaps a college graduate and would of course like to furnish a new student to his *alma mater*.

In order that the school may touch the heart of the community it must become more of a social center. The games and amusements entered into by the pupils contribute more toward this end than any other one thing. Where you see a school that can get up a ball game you will see one that is getting next to the people.

If we admit that the rural schools are not meeting their possibilities and can point out their specific weaknesses we should then seek the remedies. Some of these have already been suggested, perhaps none of them are new to you. The two great opportunities for improvement are by centralization and consolidation and the introduction of vocational studies. Centralization and consolidation will

mean fewer schools so that we can pay better salaries and have better teachers and more close supervision. It will make the school more of a social center, stimulate civic pride, increase attendance, and interest more people. Consolidation and centralization are placed first not because they are regarded as of more importance than vocational studies but because logically they should come first although actually they will come last. It will be a long time before any large per cent. of our country schools will be centralized or consolidated.

Of the vocational studies domestic science is perhaps the most important because practically all girls will become housekeepers sooner or later, most of them sooner, but this is out of my line. The course of study should include domestic science for all the girls and manual training and agriculture for all the boys and some agriculture for the girls. The manual training should be agricultural in its tendency and all exercises should lead to the making of some useful object. The pupil should be able to see some utility in the work without exercising too much of the "substance of things hoped for, the evidence of things not seen." In manual training it may sometimes be necessary to restrain the pupil's ambition, to prevent him from undertaking to make articles too difficult or complicated. Accuracy is probably the most important element here.

Agriculture may be introduced either into the elementary schools, eighth grade and lower, or into the high school. It may be introduced into the elementary schools as a separate subject, in connection with nature study, as supplementary reading, or special phases may be developed by oral teaching object lessons and busy work. While some agricultural work in the elementary schools is desirable it is of less importance than its introduction into the rural high school.

The State of Pennsylvania puts the high school education within the reach of every person within the State who is interested enough to accept the provisions of this law and has the ability to go that far. Agriculture as a separate branch is more of a high school subject than an elementary subject. That is, it can be taught to better advantage in the high school than in the grades. There are many phases that may be taught in the grades but these are better probably taught somewhat after the manner of oral instruction object lessons, etc., rather than as a distinct subject. In the high school too there is more time for the introduction of vocational subjects, and teachers are better prepared to teach them. Further the high school course without agriculture tends to separate the pupil more and more from home interests. This is not so much the case with elementary schools. The object however is not primarily to keep boys on the farm but to broaden the pupil and put him into sympathetic and intelligent relations with his surroundings. If in doing this it makes farm life more pleasant and more profitable and thus induces a larger number of the bright boys to become farmers, it is well.

There are three ways in which agriculture may be introduced into the high school. The first is by the organization of distinct Agricultural High Schools whose primary function is to make farmers or in other words to teach agriculture as a specialty in an agricultural environment. The second is the introduction of an agricultural course into our existing high schools parallel with the other three years' or four years' coursed now being given. In these courses

some agricultural subjects will be taught each term from the beginning to the end of the course. The third method is the introduction of the subject of agriculture as one of the sciences in the regular high school course, coordinate with botany, physics, and other sciences now taught.

We believe that the last named method is by far the most important and the most practicable one. We believe that the subject should be taught in the existing high schools rather than in special high schools for the reason that the State would hardly feel able to support two sets of high schools in the manner in which they should be supported to do the work well. Another reason is that these special high schools would necessarily be few in number and so far apart that they would be readily accessible to only a few of those which they would be intended to reach. A further reason is that special schools would foster the class feeling and tend to sharpen the line separating the rural from the urban classes, which is contrary to the spirit of American institutions. We believe that so far as practical the farmer should be educated along side of the lawyer, the merchant and the engineer; in the same classes as far as possible. A few special agricultural high schools would be a good thing but they should supplement rather than take the place in existing high schools.

We believe that it is more important that agriculture be taught as a branch coordinate with other sciences rather than that special agricultural courses be organized for the reason that a greater number of pupils would be reached as most of the rural high schools are not able to maintain more than one course of study. We believe that it should be required of all as its training value aside from its utility is fully as great as that of any other science. It requires as close observation and as accurate thinking as any of them. It may be the first science taught when it will serve as an introduction to the others, or it may come after physical geography and botany.

A few months ago we sent inquiries to all of the county superintendents in Pennsylvania asking for a list of the high schools of the first, second and third classes in each county teaching agriculture. Replies were received from 43 superintendents representing 85 high schools of the first class, 154 of the second class, 290 of the third, and 29 unclassified, or a total of 558 in all. These superintendents reported in the 43 counties there were 12 high schools of the first class, 36 of the second class and 107 of the third class making a total of 155 in which agriculture was being taught. Letters of inquiry were then sent to each of these 155 high schools asking the number of years in the course, the extent to which agriculture was taught, the text-book used, if any, and the proportion of time given to recitations and to practicum. Replies were received from 89 principals. Of these 53 reported that they were teaching agriculture, nine reported that it was being taught incidentally along with physical geography or some other branch, and three that it was optional in the course but was not being taken. Two schools reported separate agricultural courses. Most of them however seem to devote about one period per day for half a school year to the subject. A few teach it two or three times a week for half a year.

Twenty-six or exactly half of the schools were using a text-book which is not above the eighth grade. Nine more were using a book

that is even more elementary. Both of these are attractive books and are put out by very aggressive publishing houses which accounts for their wide introduction. Six schools were using Warren's Elements of Agriculture which is probably the best book we have for the purpose at present. Two were using Wilkinson's "Practical Agriculture" which may be made of high school rank if the teacher so chooses. Within the last month or two Halligan's "Fundamentals of Agriculture" has appeared which is also a high school book but better adapted to southern conditions and does not contain directions for laboratory and field work.

Most of the schools devote nearly all of their time to recitation giving very little to demonstrations, field or laboratory work. They give as the reason for this when asked that they do not have time for anything else. To my mind three recitations per week and two periods given to demonstrations or practicum work of some kind are desirable. It would be well to have double periods for practicum work, if possible, but even single periods would be better than giving all the time to recitations. The pupil must use his hands and eyes if he is to get the desired amount of training from the subject he cannot get it by using his memory alone. The pupil must be taught to see and do things. These inquiries show that agriculture is coming into the schools and it is our business now to see that it comes in the proper way. If we introduce merely a text-book in agriculture the result is apt to be disappointing and there is danger of a reaction. If we introduce work of too low a grade it will be disappointing. If the pupil sees in the work only things that he already knows, even if he sees them in a new light he is not getting all he is entitled to. Not only must we teach agriculture but we must teach it right, the pupil must feel that he is getting something worth while.

In teaching agriculture in the public schools we must seek to accomplish the following:

1. Give the pupil new knowledge.
2. Develop the view of the knowledge he already has.
3. Teach him to use his thinking faculties.
4. Teach him to do things.
5. Teach him to find out things for himself.
6. Correlate the school with the home life.
7. Not neglect the business side of agriculture.

While we realize that rural life problem is a large one and that the country schools are only part of it, we believe that the teaching of agriculture in these schools, as it is capable of being taught, will do more than any other one thing for the advancement of the rural community and the conservation of our natural resources.

The CHAIRMAN: We will now have the address by Prof. Clinton, on "The Present Trend of Agricultural Education."

I have the pleasure of introducing to you Prof. Clinton.

Prof. Clinton then delivered his address as follows:

THE PRESENT TREND OF AGRICULTURAL EDUCATION.

By L. A. CLINTON, *Storrs, Conn.*

When I selected my subject for the address at this meeting I had no knowledge of what the other subjects were upon the program. The large number of addresses upon the subject of agricultural education simply shows the importance of that subject and the large place it is occupying in public education at the present time.

There seems to be a general interest in the welfare of the farmer, and the strange thing about it is that the least interest of his welfare is being shown by the farmer himself. City people, college professors, railroad presidents, boards of trade, have all become interested in the welfare of the poor farmer. Meanwhile the farmer pursues the even tenor of his way, plants his crops, fights the bugs, harvests crops, sells his products and gets about thirty-five cents of the consumer's dollar paid for the same.

In every age and in every generation there are those who are inclined to look with more or less sympathy, pity or scorn upon the customs of the previous generation or age, the belief apparently being that we in our wisdom have made great progress over those who immediately preceded us. On the other hand there will always be those who are constantly living in the past. It was the "good old times," whether in religious life, or educational affairs or business. In spite of all trusts and combinations in restraint of trade there are none of us who would go back to the time of the home industry, when everything necessary in the way of wearing apparel, food products and furnishings for the house was made on the farm. While we may lament the present disregard of the Sabbath, there are none who would wish for a revival of the old manner of Sunday observance.

Schools and educational methods have also changed, and while there are some who regret the passing of the classical scholar and recognize as an educated man only one who has been trained in the classics, yet the majority of people have come to recognize that the old system of education has had its day, and that what is needed at the present time is an education which will fit the boys and girls for the practical work of life. New schools and new methods have come to stay until they shall become antiquated, and possibly the future generation will think of our age with pity, possibly with scorn, that we so slightly grasped the problem. The methods of every age are an outgrowth or development from preceding ages. Some of the best from every age is preserved, modified and developed to meet changing needs and new conditions. In this forward march there must always be some back tracking, some mistaken notions as to what is best to preserve, but the general trend is forward in the solution of the problems of life.

One of the most remarkable trends at the present time is towards agricultural education, not only of the farmers but of the masses, city people as well as country, and this general interest has been

largely created within the last few years. When the agricultural colleges were being established some fifty years ago there was no general agricultural awakening and no widespread interest in agriculture. The earliest attempts at agricultural schools were failures because the people were not especially interested. The masses of the people were producers and not consumers and the amount of product which was being produced each year was great enough to more than supply the demand for these products at reasonable prices. The importance of the federal law which resulted in establishing agricultural colleges in every state was not fully appreciated for about two generations after its enactment. At first there were but a few students and few teachers and but little to teach. There was no agricultural science, and while the men who were called to positions in agricultural colleges did noble missionary work yet their training was almost entirely from the practical side. This was necessarily so because there was little or no agricultural literature; there was little in the way of definite facts relating to agriculture; there was no problem of food supply for the working masses. In most of the states the agricultural colleges were located as separate institutions and not combined with the state university. The reason for this was because it was feared that the students in agriculture would be looked down upon by the other students; that to be known as a student of agriculture in a great university would be rather a disgrace, and that those who might wish to take the agricultural work would become lonesome and shift over into the other courses of the university. But in a few of the states the agricultural college was combined with the state university, and in most cases where this was done the agricultural college has now become the big college of the institution and the students are proud to be known as students of agriculture. City men as well as farm boys are registering for the courses and agriculture is now the popular thing. When the agricultural colleges were established it was expected that they would have a marked effect upon the farming industry. They were to bring about an educated country population; they were to result in the conservation of our agricultural resources, and through them was an attractive country life to be made possible. These hopes were not realized, and it was soon found that if agricultural education was to be developed there must be some foundation of agriculture science. This resulted in the federal law establishing agricultural experiment stations in all of the states, and in those states where experiment stations had not already been established it was required that the experiment station should be established in connection with the agricultural college.

The work of these experiment stations has become the greatest factor in agricultural education in our day. They have made possible a science of agriculture; they have established the basis for work of our agricultural colleges. In many cases the man who is working quietly in his laboratory day after day, month after month, and year after year may be the man to whom we are indebted for the most important results in relation to agriculture. The man who attracts the attention may be the successful teacher or lecturer; he may be the man who can most successfully organize farmers' institute trade, in other words the most successful advertiser. If our work

in agricultural education in this country is to be developed this will come about only through the increased support and development of our agricultural experiment stations; in careful scientific work of the investigator is necessary as a basis for instruction in the class-room. Therefore it is important that every state shall see that its agricultural experiment station is liberally supported; that the investigators are given unlimited opportunity for research work because much as we have accomplished we are just at the threshold of agricultural science.

While there is no question about the great value which resulted from the early work of the agricultural colleges yet the results were in a direction entirely unlooked for by those who were responsible for the colleges. The graduates of the college became teachers, experiment station workers, lecturers, scientific investigators in the U. S. Department of Agriculture; they even became lawyers, doctors, and occasionally a preacher was developed, but not many of them became farmers. The reason for this was that the trained men, graduates of the agricultural colleges, could do better financially elsewhere than they could on the farm. Naturally, then, they drifted into other lines of work. Those who did return to the farm, however, showed the value of the training they had received, better methods of agriculture were put into practice; and their farming methods became models for the community. Almost until the present time the agricultural colleges have continued giving a thoroughly scientific education, and while this work must be continued yet there is another growing demand at the present time, and this demand is for the popularizing of agricultural education. I would not in any way under-estimate the importance of the work which has been done by our agricultural colleges because their graduates have become leaders in every walk of life, and it was owing to the great demand for men in agricultural experiment station work and in scientific investigation of every kind that these graduates did not go back to the farm, but their work has been of direct value in promoting the interests of farm life through their application of scientific principles to the problems of the farm. There was no popular demand for the agricultural colleges to in any way change their courses of instruction or to render their work more popular. In fact the masses of people cared very little what the agricultural colleges were doing anyway, but when the price of food products began to soar beyond reach of the average consumer, and the wages received by the workmen at the end of the week were barely sufficient to pay the bills for food products which had accumulated during that week—then came the demand for a more general dissemination of agricultural information for the teaching of agriculture in the public schools. Then our great railroad corporations became interested in better farming trains, in model farms, in all that would in any way develop farm life without interfering with the price they received for the transportation of farm products. The settlement of all our arable lands, leaving no further room for expansion westward has brought about a demand for more intensive tillage of the lands which are now under cultivation. Higher production per acre must come at once if relief is to be found for the high cost of farm products. The partial depopulation of many of our rural communities has been brought about

not because of unfertile soil but simply because better opportunities have been offered elsewhere, and the farming population, like people in every walk of life, have accepted the opportunity offered them even though it necessitated leaving the farm.

The most constant and ever present demand of the human race is for food. So long as the supply is plentiful no one pays any special attention to the source from which it comes or the conditions under which it is produced so long as the product itself is in fair condition. The trouble with agricultural science and its relation to the farmer has been that there has practically been no relationship between the two. The colleges and experiment stations have gone forward with their work. A comparatively few well trained men have been developed and these men have gone into various lines of work, and the individual farmer working back over the hills has for the most part been left to work out his problems as best he might. The other day in looking out of my office window, I saw Copeland driving his ox team, walking along before them, swinging his ox whip and calling to them. He was expecting them to follow. At one time he walked so far ahead of them, expecting they were close at his heels that they apparently lost sight of his leadership and began to graze by the roadside. After walking on for some distance he swung his ox whip over his shoulder and called to them to come on, and upon looking around was surprised to see that they were far in the rear and paying no attention to his directions. This, to me, illustrates fairly well what has happened in the agricultural world. The colleges and experiment stations have gone forward with their work, expecting the farmer to follow, but he has been left far behind until he has really lost sight of the work which has been done for his benefit. While I know there are exceptional cases, and a large number of exceptions of individual farmers who have made progress and who are applying to their work the very latest and best methods known, yet farmers as a class have failed to apply the latest principles which have been worked out by our investigators. We must go back to them and keep our leadership closer to the individual farmer. We have learned that the agricultural science will not feed the hungry people of our land unless it is actually and practically applied to the production of food crops on the farm. The educational pendulum is now swinging rapidly towards the other extreme. The demand is being made that agriculture shall be taught everywhere and by everybody.

Vocational training is demanded as a part of our regular school system and in separate schools of agriculture and agricultural high schools. Agricultural education is now being given to the masses through farmers' institutes; through better farm trains; by the "schooner" wagons which go out across the country, carrying charts and illustrative material to the individual farm; by the introduction of agricultural courses in the public school; by the agricultural high schools as separate institutions; by the agricultural colleges, not only through their regular four year courses, which lead to a degree, but by their schools of agriculture; their special courses and by extension work and demonstration experiments; by experiment station bulletins; the agricultural press; by the popular monthly and weekly magazine; through the daily newspapers, and even from the pulpit of our churches as well as by the organized bureaus of the state and

national government. This all means that the effort is being made at the present time to reach the individual farmer. We have been considering farmers in the mass; we must now pay more attention to him as an individual and there must be a constantly increasing effort to reach the individual farmer and help him to solve his problems.

The difficulties which are being met with in this popularizing of agricultural education are the facts that agriculture is a peculiarly technical study, and that it requires trained teachers in order to properly give the instruction, and these trained teachers are difficult to find for the money which is available as salaries. This teaching requires not a mere statement of facts which relate to farm life, but a thorough discussion of the principles which underly these facts. Conditions may change, but where the principles are thoroughly understood the farmer should be able to apply them. This work requires time, industry and patience and while our short courses in agriculture, and the various other methods which have been adopted for the dissemination of agricultural information are doing a splendid work and will result in great improvement in farm life, yet the problem is only partially solved through these means. Thorough mental training is required for the successful pursuit of farming as an industry just as well as in any other walk of life. There is no occupation in which more problems are arising every day which must be solved upon the spot, and upon the correct solution of which depends success or failure, than in farm life.

There is no country which has a more highly developed agriculture than Denmark, and centered all over that country, within easy reach of the farm boy, is the rural high school. The boys who go to these schools are given not short courses in agriculture, but general training courses; work which is designed to develop their reasoning powers. These boys go back to the farms, better able to continue their work successfully, not because they have learned a mass of facts, which sometimes apply and sometimes do not, but because they have learned to think and to reason, and in thus learning they are better able to solve the problems of the farm than they were before.

The strenuous demand which has been made for purely informational courses has forced somewhat the hands of our agricultural colleges, and yet the real leaders in agriculture are going to be found among the best trained men who have taken the longest and most thorough courses offered in college training. Just what should be the relationship of our public school system to agriculture is a much debated question at the present time. There are some enthusiasts who would have the immediate introduction of agriculture in all the public schools; who would have the teachers without any special training or preparation begin giving instruction in agriculture. This in my opinion would be a great mistake. To properly teach any subject requires a pretty definite knowledge of that subject on the part of the teacher. This knowledge of agriculture is not possessed at the present time by any considerable number of teachers in our public schools, and it cannot be acquired upon short notice. I believe the time is not far distant when agriculture will be made a part of the instruction in all of our public schools, city as well as country, but the work will be given by teachers who have been especially trained

in agriculture science. This work will not be given because of vocational value, but because agriculture possesses peculiar value as a training subject. It is just as important that agriculture should be taught in our city schools as in our country schools. It is important that the consumer shall know something of the conditions under which farm products are produced. Many of our city people do not know what good milk is when they get it, neither do they know how to care for this milk until it is consumed. More knowledge on the part of the city people with reference to the difficulties in the production of the food products would create a broader sympathy and a more general interest in farming conditions and would result in great benefit to the farmer. This work in agriculture should be given in the higher grades and opportunities should be given to those who wish to specialize along agricultural lines, to take advanced work in that subject.

The highest degree of success in any farm community will not come through a knowledge of agriculture alone. This knowledge may result in the making of money, and when the money has been made the farmer moves to the city and a tenant comes upon the farm. The trouble here is that the social life of the community has not been developed and the farmer has not been trained so that he can see the beauty and opportunity and the advantages of the open country life. He looks upon the farm as a place to make money and so it is, but there should also be an opportunity for the enjoyment of that money to its fullest extent without moving from the farm.

One boy in my class in Rural Economics offered as an objection to farm life the fact that the best girls do not wish to marry a fellow who is going to live on a farm. Of course, the other fellows of the class immediately asked him how he knew. But if that objection is really true then the subject is worthy of the most careful investigation to find out why it is true. I believe if the young man who is living on the farm possesses that degree of culture, of training and of mastery of his business which is possessed by the most successful man in other walks of life that the best girls will not object to life on the farm. If on the other hand the farmer is lacking in training and in general culture and he sees in his farm and in farm life only an opportunity for making money, then who would blame the best girls for objecting to marrying a farmer. Improvement in the farm life in any community must come from sources acting within that community and not from without. These centers of crystallization from which will radiate the elevating influence will be the farms of those who have received the most thorough training in our schools or colleges of agriculture.

Much valuable printer's ink has been used in recent times in discussing methods for the uplifting of the farmer. In my section of New England we have a native dweller upon the soil by the name of "Harvey." In our local discussions with reference to methods of improving farm life one of my colleagues has always replied to my propositions, "Go try it on Harvey." If you can uplift him then there is some value in your proposition." It seems to me the problem of country life in every section is how we are going to reach the "Harveys." In the first place they do not care to be reached; in the second place we have no point of contact with them. The one way

that I can see to reach them is through the location in every community of men whose farms will become model farms; who will take an active interest in the improvement of church, schools and roads and all of the social conditions which make for the advancement of that community. Just as in city life the community settlement has been found to be one of the most potent factors towards improving conditions so the community settlement in country life will be found one of the most powerful factors towards improving local conditions.

The farm boys and girls are entitled to an opportunity for securing just as good an education as is within reach of the city boy or girl. At the present time this opportunity is not available. There will be no satisfactory solution of the country life problem until this condition is remedied. Twenty years ago if anyone had said that the farmer in nearly every section of our country would have his mail delivered at his door at least once every day he would have been called a dreamer, and yet at the present time the arrival of the morning paper and of the daily mail has become one of the mixed features of farm life. The next great step forward will be the organization of the township rural high school, as thoroughly graded and as thoroughly equipped as is the city high school;—the development and the training of the country boys and girls in the country, not necessarily in agriculture, but under their natural surroundings in which they will be taught to see something of the beauty of country life; something of the possibilities of the farm. Through this will come the development of our rural life; the improvements of social conditions and the establishment of better relations, and more thorough understanding between our country and city population.

DEPUTY SECRETARY MARTIN: What objection would you offer to the introduction of an arithmetic in the common schools that used for illustration and demonstration lessons in rations, feeding, fertilizers and other conditions of that kind?

PROF. CLINTON: None. Good thing. It is a good thing, and if the teacher does not have the arithmetic with these problems in it I would have this teacher make up these problems and give to the classes. The teacher should not depend on the book for these problems.

DEPUTY SECRETARY MARTIN: You think it would be a good kind of arithmetic for country schools?

PROF. CLINTON: Splendid. I do not see why they should not work on percentage with reference to fertilizers and rations. I had a boy come to me the other day. He was a graduate of college and he had worked in public schools, and he said: "I really never learned percentage until you got me to figure the percentages of nitrogen and phosphoric acid and potash and found I had learned it and now I do that figuring for all the farmers in my neighborhood."

A Member: What about geography? We have text books on geography. Should they illustrate our home State with reference to soils and altitude?

PROF. CLINTON: Perfectly well; and with reference to corn, potatoes and commerce and the order in which these agricultural products enter into commerce. There is no text book published better than the text book that picks out the meat, the kernels and draws the class out and instructs them without knowing they are being taught agriculture.

MR. BRONG: It is a general rule that all our text books are based perhaps on commercial life; that is, the text books that enter our public schools, as well as the state schools. I say not only the arithmetic, but all of them tend to train boys and girls away from the farm.

PROF. CLINTON: I think so; and then too they have city life as well as country life. City people know almost nothing about conditions of country life. The great trouble over the milk problem—I happened to pick up a Philadelphia morning paper and the first page is given up to that milk controversy. The city people don't know the conditions under which milk is produced. Night before last a man getting good milk said: "What damnable milk I am getting." He said: "It is worse than skim milk." I said: "You don't know what good milk is." Yesterday morning I took a bottle he left out to the laboratory and the Babcock test made $4\frac{1}{2}$ butter fat, and the man said it was no good. He expected the cream to be half way down the bottom of the bottle and because it was not he said the milk was no good. A milkman said a customer said to him "This milk has a thick yellow scum on the top of it." And she did not like it. One man finding fault because it did not have the scum and one woman finding fault because it did have the scum.

MRS. MONROE: Is there any objection to pupils of schools knowing that they are being taught agriculture, and what is the objection?

PROF. CLINTON: Well, one teacher said to me: "If we are going to teach agriculture, just where shall we begin, just what shall we call agriculture; and just what shall we call science in its relation to agriculture." One man reads a paper at a meeting and says we are learning too much about sciences which relate to agriculture and too little agriculture. So I wrote to the man and I said: "Will you please just define to me what you mean by the things which are about agriculture and how they differ from the things which relate to agriculture," and I never got any answer to my letter because agriculture embraces all these sciences. There is chemistry in its relation to agriculture; soil physics; physics, and I do not know but what astronomy enters in very much. All these are sciences in relation to agriculture.

Yes, I would have them. And look what that means on the part of the teacher that you are going to have teach all those things. Is it better she should do the things she knows about and do them well or have her smattering all over the subject of country life and do it only partially well?

MR. J. ALDUS HERR: What is your opinion of the Congressional agricultural schools in districts as in Wisconsin, in reference to teaching the boy agriculture on the farm? Having the object before him?

PROF. CLINTON: My opinion about teaching agriculture in the schools is this: That when it comes to rural schools it is going to require teachers trained in this subject. What I object to is every teacher teaching reading and spelling and geography and everything else is also going to be required to add agriculture to her list of studies. Out in Wisconsin where they are taking up the work they are putting trained teachers in those schools and that I agree with. But when agriculture comes with the greatest success in Pennsylvania or New York or any state it is going to be because the teacher has been especially trained along these certain lines and then the work is going to be given as it ought and we are going to leave the other teacher teach what she has been prepared to teach; and this teacher of agriculture, it may be of a consolidated school, it may be an itinerant superintendent going from school to school, as I saw who has boys growing potatoes and corn and studying those plants as no children in these schools have ever studied them before; not leaving it to every teacher here and there, but taking charge of it himself, and he is trained in that line. When it comes the way it is coming in Wisconsin with the agricultural high schools or agriculture in the high school, with trained teachers in charge of it, then I say let it come and it cannot come too soon when it comes that way.

MR. J. ALDUS HERR: The reason I asked that is that Lancaster county is a Congressional district. We have a very good trolley system. If we would have a Congressional agricultural school in our midst, adjoining us we have a couple hundred acre poor farm where they could do experimenting and many of the boys could come here and get information and work on the farm and at evening go home and be under parental care.

PROF. CLINTON: Now when you get your school you are going to send to State College and say: "We want your best men to come to take charge of this school, and we want men there who have training along certain lines and can give us the best instruction in agriculture that can be given." Good, good. That is the way to get it and when you get it that way it is right. But when you get in every little school in the country it is the exceptional teacher, the rare teacher you find here and there who can give them the instruction in agriculture and really make anything of it.

I was talking at a farmers' institute and when I got through a school marm came over and said: "I am teaching agriculture in my school and teaching it successfully." I said: "I am glad to know it." I said: "Where were you trained in agriculture?" She said: "I had the three months' course in agriculture at the New Britain Normal School." I did not discuss the subject with her any further and I did not tell her what I really thought about her knowledge of agriculture. It was not safe.

MR. PEACHEY: How long then shall we wait to get that teacher to teach agriculture as you would have him teach?

PROF. CLINTON: I would have our normal schools begin giving instruction the first year of entering, begin the first year's normal school work and have it go through ever year of the normal school course and just as fully as possible. I would have these create enthusiasm for farm life that there would be no law requiring them to teach agriculture. They would do it any way because they were interested and knew something about it.

MR. PEACHEY: I wish we could send you to the Pennsylvania Normal Schools. They need a missionary.

PROF. CLINTON: I was attending a school meeting of the people who live in a certain country school district. We were having a conference with the town school board and the secretary of that board was telling how difficult it was to get teachers for their country schools. He says: "Not a normal school in this State which trains teachers with any idea of going into the country schools." I said: "If that is so the normal schools of Connecticut ought to be reformed right away."

MISS THOMAS: Whose mission is it to reform them and whose mission to institute these agricultural schools?

PROF. CLINTON: Well, if we leave that for somebody else to do; if we each one leave it for somebody else to do, it never will be done. In every state I believe we have boards of education. In Connecticut we have a secretary of the board of education who is responsible for the control and direction of these normal schools. Now everyone who is interested ought just to shower that secretary with letters protesting against the course of study in normal schools and lack of attention to country schools. Our parents of the children who live in the country ought to appeal to that secretary to see that the graduates of these normal schools, some of them, are fitted for life, to teach in the country and not all of them for the city. It is for every man and woman here who is interested in the country to bring that about.

A Member: I would like to know how you are going to get these competent teachers unless you begin with them when boys and girls?

PROF. CLINTON: Why, we are getting them. Do you know anything about the number of students at your State College?

A Member: I don't know exactly.

PROF. CLINTON: It is large. A letter from the agricultural college this week says the students are pouring in on us; we must limit the number; we cannot take care of all of them with the maintenance appropriation. The colleges are training not only men but women who are going to take up this work, and requests are coming from schools all over the country. I never had so many letters as

this spring; from as far west as Minnesota; "Have you got men trained along certain agricultural lines who can come to begin the teaching of agricultural schools?" There is where you are going to get your men; and the agricultural colleges and normal schools as well are going to train these men and women for you.

A Member: There is no question there is a lot of young men and young women that cannot attend the inexpensive schools, at our normal schools. Shall they have no training in these lines at all?

PROF. CLINTON: I would rather they would have no training at all along these lines than to have some of the training that I have seen given along these lines. I would rather they would have none. Now then if we can find the teacher who can give that training well and good, but if they cannot give it and give it properly, it is better not given at all. The teacher that takes a book and says: "The lesson to-morrow is the next five pages:" is no teacher to be teaching agriculture in your schools.

MR. BAYARD: The trouble is when you do have these teachers you don't pay them enough. You cannot hire an agricultural college graduate to teach in the public schools. I hired two agricultural graduates last year but these two graduates have got so valuable that I could not hold them.

PROF. CLINTON: When they get so that they can teach agriculture they are worth more.

MR. BAYARD: Yes sir; more than in public schools.

PROF. CLINTON: Then put several public schools together and at the head of the agricultural work in that combined public school have a teacher in agriculture.

MR. BAYARD: That is the only way possible here.

PROF. CLINTON: We cannot do it. You must not expect to do it. But if you combine these schools you have a chance.

MR. BAYARD: That is right; but here we have a condition that confronts us. Take the State of Ohio. They passed a law this winter and are going to put agriculture in all their public schools and they are not ready for it. That bill was shoved through. I don't know if that could be done in the Pennsylvania legislature. We want to have our schools endowed before we start to teach agriculture in them. We cannot expect the teachers. They cannot afford to do it. It costs to become an agricultural teacher.

PROF. CLINTON: Showing that the work of Pennsylvania State College is valuable.

MR. JOEL HERR: I would like you to state the proportion of agricultural students there are now compared with what they have been in recent years, to know what condition our college is in.

MR. BAYARD: There are something over 630 in agriculture at the present time in the Pennsylvania State College. There are 1800 students at State College to-day and 630 are in agriculture.

PROF. CLINTON: And these men would be willing to take positions as teachers of agriculture, I think in these consolidated schools.

MR. BAYARD: Yes, but not go back into the country school work.

PROF. CLINTON: No; you must not expect these men with experience at seven to twelve dollars a week.

MR. BAYARD: They cannot do it. It costs too much to get the education. It is worth too much.

MISS THOMAS: Mr. Chairman, there seems one place to me that we could help this whole question and that is by devoting one session of the institution to the discussion of this question from a local standpoint and to educate the people in the local communities to arouse their thought along these lines and to see to it that they have the right connection between themselves and the Superintendent of Education and the Board of Education of our State. And I would also like to take exception to the statement of the previous speaker when he gave his definition of education. I may be wrong but it seems to me that it is a dangerous definition without any modification, because education should develop a better environment. I should like to ask Prof. Mairs how he could apply his definition to the children of the small sections of our State, or where we have bad environment in rural schools as we sometimes do.

PROF. MAIRS: We adopt it to the environment. We mean that we change that environment, and make an environment. We do do not want to continue that environment. That is what I meant.

MISS THOMAS: I think you better modify your definition.

PROF. MAIRS: I will take that into careful consideration.

The CHAIRMAN: We have a few moments left. Is Mr. Kester present now? He is and we will go on with the program. I now have the pleasure of introducing to you Mr. Kester who will speak to you on "Some Lessons we Should Teach."

MR. KESTER: I wish to apologize to the Chairman and this audience for being late this morning. But fifteen minutes ago I was in bed. I have spent the last two nights on the Pennsylvania Railroad, being called to the western part of Pennsylvania to attend a funeral and laid down on my return this morning for a few minutes rest. Then the porter got busy and forgot me and I forgot to get up. I can, however, tell you about all I know in about twelve minutes and leave you out in time for dinner.

My paper and its contents may be a little out of line with the thoughts so far this morning in as much as the previous subjects, as I take it, and no doubt the previous discussion has been along the line of the rural school's work entirely. My subject applies not so much to the teachers of the public schools as to what they should teach, but to us as men and women who presume to teach the fathers and mothers of this land agriculture.

Mr. Kester then presented his paper as follows:

SOME LESSONS WE SHOULD TEACH.

By R. P. KESTER, *Grampian, Pa.*

I do not expect to present anything new this morning, anything that has not been advocated by at least some of our institute speakers in the past, but realizing that some men think the only legitimate field of the institute worker is to teach how to increase production—how to make more money, I wish to call our attention to some other phases of the farmer's life that needs his increased attention and activities quite as much as that.

There is no question but what first and foremost of the practical questions is how to naturally and most cheaply maintain and increase the fertility of the land. Need of this knowledge is evident from the fact that the average farm produces little, if any, more than it did in the days of our grand-fathers. For many years much has been said and written on the subject and many bulletins published by our experiment stations giving the results of their findings, and all of this has been said and written on the subject and many bulletins published by our experiment stations giving the results of their findings, and all of this has been suggestive and useful, yet a great deal of it seems to be in the nature of temporary expedients and have not solved the problem of building up permanently and economically a productive soil. Instead of figuring so much about pounds and percentages of potash, phosphoric acid and nitrogen as purchased in the fertilizer sack, for which so great a part of the crop's value is paid, the general farmer demands and needs to know of natural methods by which he can maintain and increase his fertility and have profit at the end of the year. A few families have been doing this for years, many of them in this beautiful county of Lancaster, and in almost all the instances I have examined, the four C's—corn, cattle, clover and cultivation—have been the four corner-stones of success. These four agencies, intelligently handled, will bring success to any general farmer.

I do not wish to belittle outside agencies, but I do want to protest, to those who attempt to teach lessons on fertility, against unduly emphasizing the necessity of hauling material from the ends of the

earth to put on the land, but to teach such methods and practices as will enable the general farmer to regain, maintain and increase the productive power of his land.

Another important lesson in need of emphasis by teachers is that the farmer must specialize more than he has in the past. In the olden days when every farm was a little kingdom, independent within itself, when practically all that the farmer and his family used was produced and manufactured on the farm, the crops and rotation of that day were suited to the needs. But farmers no longer make their tools, harness, boots and shoes, soap and candles; the whir of the spinning wheel and the pounding of the loom are no longer heard in the farm home, but instead all these things are purchased necessitating the expenditure of money, the equivalent of labor or its products and the farmer who has no speciality has little to exchange for the necessities he does not produce. Farmers have been slow to adapt themselves to the changed conditions; slow to realize that he can't live the individualistic life of his grandfathers, but that he is part of a larger and more complex life where he must exchange the value of the products he has for those he does not have. He too often sticks to the crops and rotation of a former day, raising a little of everything, just enough for home use, and does not have a money crop—does not have a specialty that he may exchange for the thousand and one things required in the modern home. So we need to teach the necessity of a specialty on every farm, one suited to the man, the soil and the market. And this not as an individual, but as a community. Every community of farmers would be benefited by meeting and planning together as though their farms were one big farm and they were joint owners. In the future, crops will be raised and sold co-operatively. You say this is visionary? Maybe it is but it is in line with modern business methods. It is one of the necessities in bringing closer together the producer and the consumer, one of the most important questions confronting us. Buyers are attracted to a community where there is produced an abundance of fine fruit, or a good breed of cattle. A community noted for its good butter or its fine poultry can sell to a better advantage. In all such cases, sales are more easily made and better prices are obtained. A study of the soil, climate, water and markets should be made and the specialty selected which is best adapted to them. Farmers would find as much opportunity for applying the much-talked-of methods of "scientific management" as do the captains of other industries.

These things emphasize another important question, the need of organization among farmers. Neither the individual life nor the community life is as useful or as strong when the individual stands alone as when all are working intelligently and harmoniously together. Farmers and their families need meet together, to talk together; to discuss social, economic and political questions effecting them to the end that they may intelligently and concertedly meet the duties of citizenship resting upon them. In this way he loses the fear to think and act independently. The events of the past few months have shown the intelligent farmer that there is no such thing any more as a "stand-patter." Even the professional politicians, regardless of party, have joined hands to further legislation which we

believe to be detrimental to the best interests of American agriculture. Only the organized farmers are effective in the fight for fair treatment and a square deal.

There is a growing dissatisfaction amongst country people with the curriculum and the product of the country school. With all the clash and jangle over the new school code, little or nothing has been done to meet the needs of the rural schools. Nearly all the attention both of the commission and the legislators has been directed to the cities. This is partly due to the fact that no concerted, popular demand was made by rural people. We have not agreed as to what we want and brought it forcibly to the attention of the authorities. It is time we stop pretending that we believe a proper school course is one scheduled to begin with the primary school and ending with a college degree. However desirable it might be, we find it to be impracticable. An investigation conducted by the Sage Foundation recently, shows that out of 18 children in the First Grade Grammar school, only five reach the eighth grade and only one the High School. In the rural districts alone the proportion is much less. With all our anxiety about the young people leaving the farm, fully 90 per cent. of them remain in the country, and all the education they ever get is in the inefficient country school. Like all other questions of rural uplift and rural progress, improvement of the rural schools must originate in and be made by the rural people themselves. So it is the duty of competent teachers and speakers to lead in the demand and recommendations of such changes as will bring to the country child advantages for an education that will fit him for his life's work and make of him a contented and efficient man. For fear that we might "consign him to the farm" by giving him an education suited to his needs, our leaders have, in the past, by an unfitted school curriculum, consigned him to a life of inefficiency and poverty. An education no longer means an equipment enabling one to live without work at the expense of the ignorant, but a real education today means that training of the head and hand and will which fits the student for the fullest and most efficient life. Why then should not rural schools fit rural people for rural life? The necessary increased production of the American farm must come, not from extended acres, for there are few more, but it must come from the present farms more intelligently farmed. The future farmer must know how? and when? and why? better than his father does.

One valuable result of the Institute work, together with other agencies, is that the farmer's respect for his own business has been increased. There are fewer discouraged, complaining pessimists than there were a few years ago. This is mainly due to the fact that his greater knowledge of his business makes him feel more fully that he is, in a measure, master of the situation. As he realizes his blessings and his possibilities, he envies less his city brother; that although his cash receipts may be smaller, he enjoys a thousand things for which his city brother must pay cash.

So this is a lesson we may well continue to teach. The Institute speaker who, while showing up errors and fallacies, fails to leave a message of hope and cheer, who leaves his audience in the gloom and despondency of pessimism, does more harm than good, though he may have the wisdom of a sage on technical agriculture. On the other

hand he or she who leaves to a community a renewed faith in itself and its calling, leaves the most helpful lesson that can be taught. President Roberts of McDonald College said in speaking of industrial training, "It is not primarily intended to enable one to raise a bigger steer or bigger ear of corn, but by doing so he may make a better home for a better child." Fellow lecturers, let us think on these things. Man's education is not necessarily completed who knows how to grow big crops and make big profits, but when he knows how to expend these in improving himself, his family, his home and his community. Then only is a man in the fullest sense an ideal farmer. This nation will remain great and increase its greatness only as the innumerable country homes continue to be owned by individual farmers. No lesson we can teach is of greater importance than that of showing the young man the great importance of his getting hold of a piece of land. If that day ever comes in which the agricultural land of this nation is owned by concentrated capital and worked by peasant farmers, as other natural sources have been secured and are worked by wage workers, that day will see the decadence of this nation as a republic and the end of democracy will be at hand.

Let me urge you to leave this injunction with every man. "With all thy getting, get understanding." Men should continually strive to understand. The eternal question "why?" is as important as the question "how?" By this, man learns his relationship to his fellow-man and to the great out-of-doors. It enables him to see and to appreciate the wonder and power of the great forces with which he co-operates, and to "Look through Nature up to Nature's God."

Deputy Secretary Martin calls the attention of the audience to the program of the afternoon at this point.

The CHAIRMAN: The time has arrived for adjournment. We will adjourn until 1.30 this afternoon.

Thursday Afternoon, May 25, 1911, 1-30 o'clock.

J. Miles Derr in the Chair.

The CHAIRMAN: Ladies and gentlemen you will please come to order. The first item on our program for this afternoon is, "Common Diseases of Livestock," by Dr. C. J. Marshall, State Veterinarian, Harrisburg, Pa. I now take pleasure in introducing Dr. Marshall to you.

DR. MARSHALL: Ladies and gentlemen, I am very glad this afternoon to be able to meet you people for the first time as your State Veterinarian and probably the first time in any way. I have been assigned the subject of "Common Diseases of Livestock." It is a very large subject and I do not know whether I can handle it in a way that will interest you or not; probably not. In order to know how to discuss such a subject, it will be well to know what kind of diseases you have here, what is bothering you the most in that

line, and in that way I may help you out in some way more useful and beneficial. If any of you have any questions you want to ask in reference to diseases, if I don't refer to them in my talk and you will ask the questions, if in my power to answer them I will do so.

Dr. Marshall then presented his paper as follows:

COMMON DISEASES OF LIVESTOCK.

By DR. C. J. MARSHALL, *State Veterinarian, Harrisburg, Pa.*

At the present time most diseases affecting domestic animals are fairly well understood. Many of them may be prevented if proper measures are adopted. The knowledge possessed in reference to prevention and cure of diseases is not as well applied as it should be. It is estimated that \$5,000,000 worth of livestock is lost annually in this Commonwealth from diseases that might be prevented if the known, necessary measures were adopted to control them. This is a heavy tax and it should be our duty to prevent the loss of such extravagant sums in every possible way.

In 1792 an appropriation of \$250,000 was made by the National government of France to found the first Veterinary School in the world at Lyons. This was deemed necessary in order to devise means for preventing or controlling the extensive losses in livestock from diseases that were at that time not well understood. There were no qualified veterinarians. Veterinary medicine was practiced by quacks, charletans and misfits from the medical profession. Millions of dollars worth of livestock were lost annually in all European countries from such diseases. The worst losses were due to such diseases as anthrax, contagious pleuro-pneumonia in cattle, foot-and-mouth disease and rinderpest. Many of you can remember when contagious pleuro-pneumonia in cattle occurred in our own country. It cost our Government \$1,500,000 and took but five years to exterminate it. The last case of this disease seen in the United States was in New Jersey early in the spring of 1892. In some countries it is still prevalent. The recent outbreak of foot-and-mouth disease is familiar to all. These two diseases were exterminated quickly in this country because their great dangers were realized and proper measures were adopted for their suppression.

We have occasional losses every year in Pennsylvania from anthrax, yet it has never proved the pest here that it has and does in other countries. It is usually a fatal disease in most all of our domestic animals as well as in man. While we know no treatment to cure the disease, we do know how to prevent it and protect susceptible animals from its ravages. Rinderpest is one of the worst animal plagues known in cattle. It has probably caused more extensive losses to agriculture than any other one disease. Fortunately we have never

had an outbreak of rinderpest in America yet the disease is to be feared. It does occur in other countries, is contagious, the contagion can be carried long distances in food, clothing, hair, hides, etc. It is extremely necessary that our country should have men trained in the mysteries of this and similar uncommon disease, at all times in order that they might be recognized at once if they should appear and the necessary measures adopted for their eradication.

The National and State Government prescribe methods for handling the most important contagious diseases. By enforcing measures for suppressing such dangerous diseases as foot-and-mouth disease, contagious pleuro-pneumonia, rabies, glanders, etc., owners are frequently put to great inconvenience, and in some cases hardships are imposed that are hard to bear. It seems best in such cases that the few should suffer for the protection of the many.

To the uninformed it may appear extravagant or unreasonable for the State and National Government to spend money for Veterinary education and sanitary police measures. When it is realized what vast sums of money are invested in livestock and to what extent our people are dependent upon this industry it will be seen that very little is spent comparatively speaking to protect them from the extensive losses that are entirely possible. Our State spends about \$1,000,000 annually for the maintenance of the National Guard and for police protection. The dangers to our livestock industry from animal plagues, contagious and infectious diseases are much greater than the possibilities of war. The nine hundred members of the veterinary profession should be looked upon as so many members of our National Guard. It is the duty of each Commonwealth to see that ample facilities are afforded to educate men for this service. It is very inexpensive when compared with other forms of protection that is afforded our citizens and the monetary value represented. Veterinarians and agriculturalists in general should know the great dangers that exist in this line and be prepared at a moment's warning to meet dangerous contagions or infectious diseases and know how to exterminate them.

The great mysteries surrounding the causes of many infectious diseases have been cleared up in the past fifty years. The true cause of anthrax, which perplexed nations for centuries, was one of the first to be discovered. It is caused by a small organism that belongs to the vegetable kingdom and it is so small that it can be seen only with the microscope. Its life history now is well known. How it is transmitted to animals and from them is no longer a mystery. When a district becomes infected with this organism it may remain and is a source of danger for years.

Among the diseases, the causes of which have been discovered since that of anthrax, might be mentioned tuberculosis, glanders, hog cholera, tetanus or lock jaw, black leg, lumpy jaw in cattle, strangles or colt distemper in horses, fowl cholera, nodular disease in sheep, Texas fever, contagious abortion in cattle, etc. These diseases cannot spring up spontaneously. The specific organisms that produces them is invariably the cause. In most cases no curative measures have been discovered for these diseases and we are nearly as helpless in treating animals so afflicted as we were before Veterinary Schools were organized. We should not be discouraged, however, for much

valuable information has been obtained in reference to them. When any such disease occurs we now have means for making a positive diagnosis. This is especially important. One of our states spent thousands of dollars a few years since fighting an outbreak of foot-and-mouth disease and later found that the disease was caused by eating smut on grain and was of very little importance.

Aside from our ability to diagnose or recognize the above named diseases, many other points of importance have been determined in reference to them. In some cases vaccination may be used to prevent them. We also know how to destroy the germs outside of the animal body or how to prevent such disease from spreading from infected areas to animals and man.

Among these diseases against which a satisfactory vaccination has been discovered might be mentioned tetanus or lock jaw, anthrax, blackleg, hog cholera, Texas fever and rabies or hydrophobia. It is hoped that similar measures of prevention may soon be discovered for other incurable diseases.

A large number of the above named diseases is more or less prevalent in our own State. Among them might be mentioned tuberculosis, hog cholera, contagious abortion, rabies, mange in horses, glanders, blackleg and anthrax. Any or all such diseases might be better controlled and some of them exterminated if the knowledge available in reference to them was disseminated among those interested. The sensible, practical solution for the extermination of all such diseases may not be entirely settled; but the State Livestock Sanitary Board stands ready to assist those who apply for assistance and it is earnestly hoped that effectual service may be rendered in all such cases.

The fact that tuberculosis can be eliminated from dairy herds has been demonstrated beyond a doubt. You may consider the present method extravagant, yet there is a question whether it may not be advisable to adopt the apparent extravagant measure and rid your herds of this pest.

The measures for controlling glanders, contagious dysentery in young animals, blackleg, contagious abortion and mange are less expensive and more easily applied. By rigidly enforcing the principles of our present knowledge the losses from such diseases should be very small.

There is another class of common diseases of livestock which causes extensive losses and over which the State has no jurisdiction. The most conspicuous diseases of this class are such familiar conditions as blood poisoning, colic, founder, heat stroke, influenza, pneumonia, bloat in cattle, garget or inflammation of the udder and among parasitic diseases might be mentioned nodular diseases in sheep, tape worm in sheep, lice, hoose or worm bronchitis in calves, gapes in chickens and many other familiar diseases too numerous to mention.

Many such diseases might be prevented if proper attention was given to animals in the way of care, feeding, exercise, rest and sanitary measures in general. They are curable in most cases if the proper form of treatment is adopted before the symptoms have progressed too far.

In some cases the disease is not recognized and proper measures for its cure are not adopted till the patient is past all hope. Too much

time is wasted in either waiting for the animals to recover without treatment or some patent medicine, home remedy or that suggested by those not competent to prescribe is given a trial. The time to begin treating sick animals that are in need of treatment is in the beginning and then no medicine should be used unless it is prescribed by one who knows what is wrong with the animal in question and also the dose and effect to be expected from its administration. In most cases the handy dose of medicine does more harm than good. You may say that you have cured many cases of colic in this way. It is a well known fact that many cases of colic will recover if no medicine is given. Colic frequently kills quickly and in spite of the most approved system of treatment. It is, therefore, advisable to look upon colic as a dangerous disease and treat it accordingly.

Cases of blood poisoning usually develop as a result of wound infection. Serious and dangerous forms may develop from apparently insignificant wounds. Nail wounds and wounds from fork tines are especially dangerous and the danger is increased by applying poultices to them. We frequently find such wounds dressed with poultices made of cow manure, flaxseed, wheat bran, etc., and the case in the last stages of lockjaw which may have existed for days but had not been recognized. Lockjaw can be caused in no other way than by the specific germ that is known to produce it, gaining admission in some way to the animals body. It may gain such admission through small wounds from which air is excluded. The animal may be vaccinated any time in a week after such a wound and the disease will not occur. After the disease has developed treatment is nearly hopeless yet occasionally the patient will recover either with or without treatment. It is always advisable to vaccinate animals to prevent this disease when a suspicious wound has been received. The wound should also receive antiseptic treatment.

Horses are often foundered by suddenly checking a perspiration as by giving too much cold water soon after a drive or allowing the horse to stand in a draft when sweating. The disease occurs in a few hours after such exposure and if recognized promptly and the proper treatment applied soon enough the case should make a complete recovery in a few days. When such cases are not recognized, are neglected or not properly treated for three or four days or more there is great danger of bad results and the animal may die or is left a cripple for the balance of its life. The best medical attention, if begun late in this disease, will seldom restore such animals to usefulness. All prepared medicines are worthless in treating founder. The best medical attendance should be obtained for such cases and as soon as possible.

The value of a good cow is often materially reduced by a slight case of garget. This disease is usually recognized soon enough but proper treatment is frequently neglected until it is too late. The disease will seldom recover without treatment. It is advisable in most cases where a valuable cow develops this condition to provide a nurse as well as a veterinarian. The case may be cured in the first two or three days if properly treated. After a case has been neglected or improperly treated for a few days the hopes of a cure are slim even though the best form of treatment may be used.

Influenza in horses is not a dangerous disease. Most cases will recover even if no medical attention is given. The greatest danger

is due to the fact that it sometimes develops into pneumonia, pleurisy, or some other dangerous complication. These diseases should be recognized early and treatment begun promptly. The average layman can seldom recognize pneumonia or pleurisy even in any stage. Proper treatment begun in the first twenty-four hours after pneumonia develops is of more value in restoring the animal to health than any that might be given for the next week or ten days. There is no specific form of treatment for pneumonia yet if properly treated very few cases should die.

Heavy losses are sustained each year from parasitic disease. Lice are often due to neglect on the part of the attendant yet they are not seldom found on animals that receive the best of attention. The methods for exterminating them are well known and stock owners should not underestimate the damage that is caused by parasites. Whitewash should be freely used in stables, poultry pens, etc., that are infected, manure and filth should be frequently removed. Any of the coal tar preparations may be effectively used. They should not be applied on an animal's skin without being properly reduced. Many animals have been severely burned or even killed by applying such remedies either full strength or too strong.

Gapes occur in young chickens and turkeys. The cause is a small worm that may be found in the throat. Infection takes place by eating or drinking food or water that contains the eggs of the parasite. It can usually be prevented by keeping such young birds on clean board floors till they are a few weeks old. Such floors should be scalded or washed with creolin solution every few days to destroy the parasites, their eggs or larvae.

Sheep suffer most of any of our domestic animals with diseases caused by parasites. Tape worms, stomach worms and nodular disease are very common and when any or all such diseases occur in a flock of sheep the industry of sheep raising cannot be carried on profitably so long as any parasites are present. Such parasites are propagated by eggs. Infection takes place through food and drink. Wet pastures, stagnant pools of water or swamp land is much more dangerous because the eggs and larvae find, in such places, conditions favorable to them. It is well known that sheep do better on high dry land. These diseases are easily recognized because the parasite or its eggs can be found on post mortem. Satisfactory and economical measures are known for ridding a flock of such diseases. In some cases it is advisable to abandon sheep raising for a time and allow such infection to die out naturally. A period of one year is often sufficient.

Much more attention is given to the subject of common diseases of livestock in European countries than in our own. American people are considered more extravagant in many ways than our foreign friends. Money is easier to get and is consequently more willingly spent. In some cases the owner may feel that a diseased or injured animal is a matter of small consequence and allow it to die or become worthless rather than to be bothered with treating it. In most cases it is best from a financial, as well as from a humanitarian standpoint, to provide the proper treatment for all suffering animals. This should be done in the way of careful nursing as well as in capable medical attention.

A Member: Speaking of rabies and dogs, if the dogs were muzzled would they be safe?

DR. MARSHALL: That would be the proper thing to do. In addition to that I think the people should keep the dogs in the house or where they belong. If they kept the muzzles on all the time it would be satisfactory.

A Member: Just one of these strap muzzles around the head?

DR. MARSHALL: Yes, that is a good muzzle. Some are objectionable and some are not. Some have the straps coming down the middle of the forehead. That muzzle where there are straps on each side and the muzzle goes around close to the eyes, I think we are having the best success with that kind of muzzle. It can be made cheaply with three pieces of strap and a few rivets. You must have a muzzle that fits the dog. People fix up some kind of a thing to make believe it is a muzzle which is no good.

A Member: Is glanders fatal to man?

DR. MARSHALL: Glanders is most always fatal to man. One of my schoolmates died of glanders. This schoolmate when we were just good sized boys was helping his father in the woods to bring out logs in winter. The boy's father had bought three cheap horses to haul the logs to the mill. The boy's hands were chapped from handling the snow and log chain and about six weeks after they got these horses one of the horses died. They knew the horse had a discharge from the nose but thought it a bad cold. This friend used to wipe the discharge off the horse's nose with his hand. He was taken sick and the doctor thought he had typhoid fever but soon found it was altogether different. The boy discharged from abscesses that formed on the neck and they then found it was a case of glanders. Then a treatment was begun on him. He lived nine months after the disease occurred, but all that time he was covered with boils, a regular case of farcy and glanders. The difference is that farcy is where the disease breaks out on the surface and glanders where the discharge is from the nose. In this case it was what is known as farcy. He had boils on the arms, legs and neck and all portions of the body.

A Member: Do you know of any cases of tuberculosis in calves?

DR. MARSHALL: It is very seldom that a calf develops tuberculosis until after six months old.

MR. J. ALDUS HERR: So far as which is the most detriment to the dairymen of the United States, tuberculosis or abortion in the herd, we hear quite a good deal about tuberculosis but little about abortion, and I can say from actual experience that where herds have been infected with abortion it is a very great detriment.

DR. MARSHALL: Contagious abortion is a nuisance and a great detriment to people who breed animals and causes extensive losses. That disease is one that we do not understand well. There has been very good work done in the past two years on contagious abortion. In 1905 King Edward appointed a commission of seven different men who are interested in agriculture, to study that disease. They studied it carefully and investigated a lot of cases and discovered the germ that causes the disease and they discovered a preventive inoculation. They believe yet that there is going to be something accomplished by that preventive inoculation. The commission that got out the report five years ago on how to prevent contagious abortion promised that they would make another report when they saw the results of vaccination and recently we wrote to McFadyen, of London, the Chairman of the Commission, asking what results they had in vaccination against contagious abortion but we have not heard from him yet. Their report is not out yet. It has been used for the last five years in England. There is nothing in that line done in this country. The disease in this country is pretty hard to get rid of by treatment. The commission discovered some things about this disease that I do not think are well understood. They found infection more often took place through the feed; that the animals running in the fields soiled the grass and feed with their discharge and the disease was contracted in that way a great deal more often than in any other way.

A Member: How can you prevent this abortion we have in our herds to-day.

DR. MARSHALL: I don't believe there is any way discovered that you can do it.

A Member: Anything we can do that will stave it off by inoculation?

DR. MARSHALL: No; they may have this vaccination scheme perfected in a few years so it will be useful, but at present we don't recommend it. We are going to study that disease next year. We have made arrangements to study the disease and see what can be done. If we accomplish anything we will be very glad to furnish that information to the breeders.

A Member: Is carbolic acid any good?

DR. MARSHALL: It is not worth bothering with.

A Member: In any way, as a spray or in food?

DR. MARSHALL: No; the commission to study that disease says that it is a worthless form of treatment.

A Member: The reason I asked that question is this. We have abortion all around our herd but don't have in our own herd, and we sprayed the animals with carbolic acid and fed them a little and I wondered if it helped it.

DR. MARSHALL: Carbolic acid or any disinfectant is useful to destroy infection around the stable and around the yard and where put on the coat of the animal, but I doubt if given to them hyperdermically or given internally, as done to some herds at present, I doubt if it has any value at all; but use plenty around the stable and where infection is and it is useful. It is important also if they have aborted to spray around, particularly where there may be any discharge.

A Member: We do that and disinfect very thoroughly.

DR. MARSHALL: There is another thing not so well understood about contagious abortion. That is the fact that diseased animals contract natural immunity. An animal very seldom aborts three times. The first, and not so many the second and hardly ever the third time, and if you try some remedy about the time of the first abortion you think you have cured the disease. That is the reason a good many patent medicine systems of treatment have appeared so encouraging to people who have been bothered with this disease in their animals.

A Member: Have you heard of the Roberts treatment?

DR. MARSHALL: Yes sir.

A Member: Isn't that a good thing?

DR. MARSHALL: It is useful because you follow out a good system if you follow out the instruction given in the pamphlet about disinfecting your stable and taking care of the cattle that abort. The medicine itself is worthless. It is recommended as vaccine and sold to the farmers all over the country and advertised in our stock papers and pamphlets sent out. It was analyzed in Washington by the Bureau of Animal Industry and found out there that it is carbolic acid and not vaccine at all. And you can get a barrel of carbolic acid for what it costs to treat one herd. You can use carbolic acid or creoline, bluestone or bichloride of mercury and use as thoroughly as you do that treatment recommended that you speak of and get just as good results.

A Member: Can you tell us how we can know that we have tuberculosis in our herds?

DR. MARSHALL: In looking over a herd of fifteen or twenty head you can usually tell whether tuberculosis is in the herd. If you have a herd and some animal becomes thin and emaciated in spite of careful attention and it finally dies—that may take place in four years—and maybe in six months another cow goes down. Usually these cases have tuberculosis. If you find one case of tuberculosis in the herd you may be sure you have more and the only way to find out how much is by the tuberculin test.

A Member: Has this tuberculin test ever caused tuberculosis?

DR. MARSHALL: I would say it never did.

A Member: What is the cause of garget?

DR. MARSHALL: Inflammation of the udder usually comes from bruises. Sometimes one cow hurts the other; sometimes one steps on the other; sometimes throwing a stone or hitting with a club, and getting kicked with the others. All these things may set us inflammation; and sometimes we have a bad form of the disease develop from suddenly chilling the udder. I remember a very good cow that developed a bad case of garget from lying in water one night. This cow was kept in a box stall and a bucket of water was set in the stall and during the night the cow kicked the water over and the cow laid with her udder in the wet bedding and the next morning had a miserable case of garget. She eventually got well of the disease but never was one-half as good a cow as before it occurred.

A Member: By the feeding of concentrated food, will cottonseed meal induce it?

DR. MARSHALL: Feeding rich foods, and crowding animals to get large flow of milk make them more sensitive to inflammation of the udder than where not forced.

A Member: Here is another difficulty in milking cows: Sometimes we get a case where the milk stops and cannot get out. It is swollen up at the end of the teat. What treatment would you give for that to get it out?

DR. MARSHALL: It is a hard matter to do it, but the milk should be removed if possible. Bathe with hot water and try to get the milk out. I know of cases where they use the teat tube but a man usually is too careless with such an instrument and may spoil a cow's udder with it. The tube should be kept absolutely clean before being inserted in the teat. I know persons to use a rye straw but it is not good practice.

A Member: They you would not recommend the milking machine with four tubes for drawing the milk from the udder?

DR. MARSHALL: I would not recommend that where the cows have garget or inflammation of the udder. I am not interested in the milking machines. I have seen them used but never saw one turn out successful. I don't want to recommend them or condemn them. I hope there will be a time when they will have one that will be successful.

A Member: What do you do for garget?

DR. MARSHALL: The best thing is to milk the cow frequently; cut down the amount of feed, give hay, stalks or dry feed. Milk frequently and use plenty of hot water. That kind of treatment usually brings it out but it should be done right away. Hold hot

cloths up against the udder with a bandage. Hot water is the best thing you can use.

The CHAIRMAN: I had a loss this spring of two valuable foals. I would like to have a little talk on the subject of the management of young foals. These colts both lived to be a little past two weeks of age. The one of them I had in the care of a young veterinarian lately graduated and thought when I first called him that the colt would be saved. The first I noticed anything wrong with the colt was about ten days of age. When he was left out for exercise and grass he let a blue yellowing substance from his nostrils and I thought he had taken a heavy cold and the next time he was limping and I called the veterinarian then and he thought it joint ill and said it was caused from having infection of the navel and this colt died. This was on Monday and Friday night the colt died because it could not breathe. It seemed to be clogged in the head so it could not get its breath. And the second colt when the veterinarian came and while I was helping to take off the bandage we thought it would smother in the stable. Its breath came slowly, one and one-half a minute, we bandaged it again and seemed to be better and we left it till six o'clock and from that time on to midnight I worked with it, steaming it with turpentine and about midnight it was up and sneezed and seemed strong and whinnied for its mother.

DR. MARSHALL: Did you have any trouble with disease of that kind on that farm before?

The CHAIRMAN: No, not for years I have not. I have another colt in the same stable.

DR. MARSHALL: A disease of that history common in horse breeding sections is an infection that takes place in the navel and usually the first symptoms you notice is lameness. He says the first symptom was discharge from the nose.

The CHAIRMAN: One was lame; the other was not lame.

DR. MARSHALL: That was considered most always a fatal disease of colts until the last few years they have been using a vaccine that works well, with that treatment they usually get well. We had good results with it, and I think if you have any more such trouble if you will notify the State Livestock Sanitary Board we may be able to help you.

The CHAIRMAN: Do you think it is due to carelessness or bad management?

DR. MARSHALL: No. It is a good precaution to take in this case when first dropped if you touch the umbilicus with tincture of iodine or about 5 per cent. solution of carbolic acid and in some cases when troubled with this disease we put a bandage around the colt's body for 24 hours; some cotton wet with bichloride of mercury or carbolic acid and tied around the body for two or three days is good. There is nothing you can do after it is started. The treatment is

practically hopeless unless you use the vaccine and then the chances are fairly good.

I think I am trespassing upon somebody else's time. I am much obliged for the attention you have given and any time the State Livestock Sanitary Board can be of use to you don't hesitate to command us.

The CHAIRMAN: The next topic on the program for this afternoon is "Cultivation and Harvesting of Tobacco," by E. K. Hibshman, Ephrata, Pa. I now have the pleasure of introducing Mr. Hibshman to you.

Mr. Hibshman presented his paper as follows:

CULTIVATION AND HARVESTING OF TOBACCO.

By E. K. HIBSHMAN, *Ephrata, Pa.*

Mr. Chairman, Ladies and Gentlemen: In this talk on tobacco, I propose to tell you the practical side of it; that is, the way the farmers grow it here and the method in which they handle it. But before I start to tell you that, for the benefit of those who do not live in this county and are not acquainted with conditions I better explain our system here. Nature has provided Lancaster county with a very deep, rich limestone soil over the greater part of it. Some parts of the county, the northern part and central part, do not have the limestone soil. Through the central part we have a type of soil that is known as Hagerstown loam; but it is on this limestone soil that the greater part or portion of the tobacco is grown, and we do grow quite a good deal here, two-thirds or three-fourths of all the tobacco grown in Pennsylvania.

When tobacco was first grown in this country, and we follow the history of the different tobacco sections, principally those of the South, we find that they grew tobacco year after year on the same soil and the result of this was that the soils gave out; they farmed out all the humus. But here in Pennsylvania our conditions were different. The first men that began growing tobacco here began growing it in rotation with their crops and that is the way we are growing it today. The rotation here in Lancaster county differs very little from that generally followed over Pennsylvania; that is, the four year rotation, wheat, grass, corn and oats, only instead of oats we grow tobacco and so our rotation here is wheat, corn and

tobacco. Now, there may be some exceptions to that, where the man instead of plowing corn stubble for tobacco is plowing under sod; but in general that is our rotation. Aside from that we do something else in Lancaster county that a good many do not do, and that is we feed a great deal of stock. In Lancaster county alone there is fed annually over 40,000 head of steers. Instead of selling our corn, selling our hay and our straw the farmer goes to our stockyard—Lancaster has a very good stock market—and buys a stable full of cattle. He buys from September to November and takes them home and stables them and feeds the corn and hay and beds the straw. In the spring the fat cattle are ready for the block. Instead of getting cash, however, for his straw and hay and corn he has a large heap of manure which he puts back on the land and in that way he is keeping on the farm almost everything that he grows. Practically the only two things he sells are his wheat and tobacco. He follows that system in order to get plenty of manure, and instead of our soil getting poorer year after year here, as it did in other tobacco sections of the country, it is getting better because the humus supply is not going down.

Tobacco grown in different sections of the United States is used for different purposes and classified according to the purposes for which used; as, for instance, where they are growing a very fine leaf that is adapted for cigar wrappers, they grow what is called wrapper tobacco; another place plug tobacco and cigarette and pipe tobacco. Here in Pennsylvania we grow what is used for cigar filler, and there is an established market and demand for Pennsylvania tobacco. It is called cigar filler tobacco and whenever the name Pennsylvania is applied to tobacco you can be sure that means cigar filler tobacco.

The crop is started about the first week in April. The farmer makes a seed bed about six feet wide and as long as necessary, according to how many acres he is going to set out, and about the first week in April he sows his seed. One peculiar thing about the tobacco crop is the fact that the seed is very cheap. For fifty cents you can buy enough to grow \$700 or \$800 worth of tobacco. The proportion of the cost of seed to the value of the crop is quite different from that of most crops. I have here a vial of seed (showing) and you can see how very fine it is. There is enough seed there to plant 20 acres and yet that seed came from one stalk. Right along this line I want to mention where they are doing a little improvement work along the line of seed and seed cleaning. The farmers clean their seed wheat, but many of them don't stop to think about cleaning tobacco seed and in this way there is a lot of light chaff seed gotten which will give poor plants with little vitality. Now the United States government has devised a machine by which it can blow out the light chaff seed. They have a machine or glass tube about five feet long with fine wire gauze on the bottom and pour the seed in and force air through and it takes the chaff out and leaves the heavy seed in there. It makes the seed very nice and clean, and it will germinate more uniformly in the seedbed and give more uniformity of plants. He sows the seed on top of the soil, usually mixing about a tablespoonful of seed into a two gallon sprinkling can full of water and then sprinkling the water evenly upon the bed. An even tablespoonful will sow about 1 square rod. Over

the top of the frame he will stretch a cloth several inches from the surface of the seed bed. This is called tobacco muslin. It is a little heavier than cheese cloth, but not as heavy as regular muslin. By this time of the year they are ready to begin to plant. I happen to have several plants here about the size for transplanting. The plants are drawn from the seed bed, the bed being first well watered to let as much of the roots and ground on as you can to set in the field. In plowing we endeavor to plow as deep as you well can because the tobacco is a comparatively deep rooted crop and so one thing essential is deep plowing. The next thing to get is a fine preparation of the soil so that when you set out a plant there will be fine soil particles to put around it and not let the sun dry up the roots, and good preparation of the field is essential. There is some commercial fertilizer used in this county, but not as much as in other sections because we make so much manure it is not necessary to spend money for commercial fertilizers. It may be that like clover and potatoes it wants potash. It needs potash to give it that green color and good quality, but in using potash we must not use muriate or chloride of potash. In Pennsylvania tobacco it is essential that our tobacco burns, because, no matter what the flavor, if it would not burn it would not be any good for cigar purposes. It is essential that it burn and in buying fertilizer for tobacco we want the sulphate of potash. We find cottonseed meal for nitrogen is very well adapted for growing tobacco, because in cotton seed meal the nitrogen is available gradually. This must rot in the soil and decaying gradually give off the nitrogen. If the nitrogen is given off too rapidly in the soil it will grow too rapidly and too much of the strength of the plant goes to the frame work of the leaf and you get a heavier weight feaf but not as valuable as a plant that grows more steadily. So cotton give a good source of nitrogen because it is gradually available.

Just about this time I saw from the trolley window this morning several places where they set a few plants and our planting season is about beginning. They set these plants out with a machine called the transplanting machine, built especially for it and brought here from Wisconsin. The machine requires three men to operate it, two men to set the plants and one man to drive. On this machine is a barrel of water which waters the plant as it is set. There are cogs on the wheel from 18 to 20, 24, or 30 inches apart, depending what distance you plant, and there is a spike which these engage and runs out about half a pint of water, and every time the water is left out you set your plant and that is the way the distance is regulated. Then there is a "V" shaped plow drawn through the ground and makes a little furrow, then after this plow there are blades or paddles which draw the ground together. Between the blades and and this "V" shaped plow there is an opening in which you set your plants. The men sit on the planter with a number of plants in their laps and they set the plants with one hand, the men on the left sets with the right hand and the man on the right with the left hand and each man setting the alternat plants. He takes the plant like this and sets it in the hole where the water has been dropped and the paddles of the machine pack the ground around it and the plant sets up like that. The same machine would set cabbage plants provided your machine is built so as you could get your rows close enough.

Our tobacco is planted in rows about three and one half feet apart. We don't get much closer than three feet with the planter as it is built, but I have no doubt that a machine could be built to set cabbage plants that you could get closer. Generally the Pennsylvania broad leaf tobacco which we grow is placed from twenty-four to thirty inches in the row with the rows about three and one half feet apart.

The first trouble after planting is the cut worm. Very often a few days or even the first night after the tobacco plants are set out this worm will eat off a great many. Various remedies have been tried and the one most successful and practical on the experiment plot was in making a mixture of about a bushel of bran, a pound of Paris green and a quart of molasses and put enough water to it to get a crumbly mass and mix all into a candy bucket and take a small bucket and drop a pinch at each plant. The molasses will draw the cut worm and he will eat that before the plant. Last year in planting an acre, planting by hand on account of the large number of small plots, we turned up many cut worms with the trowel, and in planting that acre. There must have been a great many that we did not turn up. I put on that mixture of bran, Paris green and molasses and not more than six plants on the acre were missing. We think that an effective method.

After your field is set out the cultivation is almost the same as that for corn. The first cultivation we do not work too close to the plant. The roots of the plant must be established before we start thorough cultivation; then cultivate deeply for a while and gradually right up towards the plant. As these leaves develop it will lay down and spread out and by ridging up we can keep it thrown up and make it easier to get through the rows.

I have here a number of stalks of tobacco. While the crop is growing other insects attack it. There is one worm known as the tobacco worm that causes a lot of damage. A moth comes flying over the fields in the evening, and lays its eggs on the under side of the leaves. These eggs hatch out into a small green worm. The worm grown rapidly and in three weeks it gets about three inches long. It shears off the leaves and eats everything but the mid rib. Then it creeps into the ground and changes into another pupae and later comes out as a moth and lays another set of eggs. There are two broods in a year. Another insect is the grasshopper. This jumps and will eat a hole in a leaf and then jump over to another leaf and eat a hole there. Sometimes there is a little black insect called the flea beetle comes along and eats a small hole, a shot hole. These are not so injurious to cigar filler tobacco but yet damage it quite a bit. One of the worst things is a hail storm. A hail storm will ruin the entire crop. If a hail stone goes through a leaf you can always tell the mark on the leaf.

Now I have here a cured stalk of tobacco just as taken out of the curing shed during the winter. Now the purpose of the tobacco plant, of course, will be to produce seed. Along towards fall, about the last of July, there appears on the top of the plant here a bud which will be a seed head. If you leave that bud develop and the flowers come out and seed develop, it is going to change the type of the plant. The upper leaves will be small, hard and woody, and the plant will not ripen up and the quality of the tobacco be poor. So

we go along and break out that seed head as high as you want your plant to be and with as many leaves on as you want to it. That is called topping. Sometimes some of the sections will top ten leaves, some twelve leaves some more. As soon as the plant is topped it develops what is called suckers. In the axil of each leaf there develops a branch same as that developed, first above. This appears first at the top leaves and then on down the stalk. If you leave these grow they will grow up and develop seed and the branch growing up in the axil of the leaf would naturally take the strength away from the leaf, so the grower keeps that broken out. After the upper four are broken out about four more come in and that way on to the bottom of the stalk. By keeping these broken out you drive all the strength of the plant into the leaves and get a larger, finer, softer leaf. If you leave the suckers grow it will be the same as not topping the plant, because the strength of the plant will go into the suckers and the leaf will suffer and get hard and woody. Oftentimes the weather has a great deal to do with the time the plants seed. If we have a spell of dry weather then the plants go to seed a good deal sooner. It is natural they should, too. You cut a good plant under adverse conditions and it will try to develop seed and reproduce itself before the strength is gone.

The better the grower cultivates the soil the better he conserves the moisture and the better the growing conditions are for the plants. During the seasons of 1908 and 1909 I saw a great deal of difference on different farms here in the county. One farmer when the dry weather set in stops cultivating. Another grower kept on cultivating. The man that stopped was losing moisture because the ground became hard and baked. And the man who kept on cultivating kept a mulch on top and prevented the sun from evaporating the moisture. The season has a great deal to do with the size and body of the leaf. During a very dry season your leaf will be shorter and a great deal heavier. During a wet season it grows more rapidly and grows finer. The quicker the plant grows the better the leaf. In Connecticut and Florida they use a great deal of commercial fertilizer and grow more rapidly in order to get a thin leaf. If a get dry weather it makes a heavy leaf. We don't want too thin a leaf, though it not advisable to get too heavy. We want a medium weight leaf and good size.

During all this time or almost any stage of tobacco there is a disease that is liable to set in and, by the way, there is no section of the country in this world that does not have this disease. It is a disease called Calico, or technically known as mosaic. If it attacks the plants when young the plants become rusty and go to pieces. When it attacks the plant almost grown the upper leaves get it, but the lower leaves do not develop it and the upper leaves show very little sign of it after cured. It does not do much damage after the plant is grown up, but when it attacks the young plants it will do damage. Just what the cause of this disease is we do not know, but it compares very favorably with the "yellows" in peaches.

About the last of August or first of September the tobacco begins to ripen. Then it is ready to put away. When it stops in its growth it is said to be ripe and there are several simple tests which will tell when this stage is. The leaf as it stands on the plant stands this way. When the leaf begins to ripen, around the edges here you will

notice sort of a mottled appearance. You will see a green little spot with more green. It gets a mottled appearance and if you take hold of it, it feels like leather, and then your tobacco is ripe and ready to cut. At the same time when the leaf is ripe and you turn it over between the finger and thumb it will crack, and you can be sure that your crop is ripe. It has come to the stage where it is going to cure up with better coloring and weight.

Before we come to the harvesting I better mention a little about the selection of the seed plants. There is one mistake that the farmers have made in this section as well as in other sections, and that is the careless, haphazard way in which they select the seed plants. Usually they let a half dozen stalks stand for seed. They don't appreciate they should have the best stalks in the field for next year's crop. The proper thing to do would be when topping to pick out the seed stalks and look for certain qualities—I am not going into breeding work—but one of them is the number of leaves on the plant. Many of our farmers have strains that will produce twelve or even fourteen leaves. By counting the leaves they will be surprised to find the difference. Here is a plant that has fourteen leaves and here is one that has sixteen leaves. If this plant here has enough vitality to develop sixteen leaves next year where this has fourteen, it will mean two leaves more on each plant. That will mean quite a few pounds more in the aggregate. This type here has eighteen leaves. This is, however, a good strain or type, but it was not taken right out of the field, commercially grown. It is out of an experimental crop. But the point I want to make is that the farmer should pay more more attention to the selection of the seed than he does. He thinks that is an easy matter and pays no attention to it.

After the crop has become ripe they begin to harvest. The stalk it cut off at the ground with a pair of long handled shears. After it is cut off it is allowed to lie on the ground for an hour or more to become wilted. It is then picked up and speared upon lath. Tobacco lath are four feet in length and a little heavier than the sort used for building. On the end of the lath we put an iron spear. The iron point is forced through here. About five or six of these stalks are strung upon the lath and then it is taken to the curing barn. The curing process takes eight to ten weeks in our climate on this kind of tobacco. There is a thinner tobacco that cures more rapidly. When this plant is cut it is very heavy. A lath with six stalks like that on is as much as one man can handle, and work all day handling. Now then practically all that moisture must go out of the stalk by evaporation in the curing barn. The curing barn must be well supplied with ventilators in order to keep the air moving and carry out tons of water held in there in that green crop. Curing is not simply the drying out of all moisture. It is the general impression that curing is simply a drying process. It is not. When this plant is cut off at the ground the supply of nourishment is cut off and that plant starves to death. Now if that tobacco lays in the sun too long and becomes scorched or sunburnt it will not cure up, but always stay green in color. Rapid chemical changes take place in the leaf in curing. The last of the crop is harvested just before frost. Sometimes we get caught with the frost. Frost will ruin a crop of tobacco. It is another thing that the growers must watch out for. There is perhaps a worse thing that the

grower must watch out for. When the moisture is evaporating out of these leaves in the shed and warm, dark, cloudy weather comes, he is likely to have his tobacco pole-burn, and after pole-burn once gets started it is hard to check, and in the course of four or five hours it will ruin a crop of tobacco. Pole-burn is a fungus disease that attacks the surface of the leaves and decomposition sets up, and it will become black as if it were rotting and the next day the leaves fall to the ground. This makes the crop practically worthless because you cannot touch the leaf without your fingers going through it. And it is damp, foggy weather that brings about this disease. So that when the grower sees that he is going to experience that kind of weather he closes the ventilators in the shed. So he must have the shed shut up. Then at other times he must open up the shed and let the fresh air in and the shed must be fixed to open up and close up. If hung too close the air cannot circulate through it.

A Member: How close on the racks do you hang it?

MR. HIBSHMAN: It depends on the size of the tobacco. Some years it grows very stiff that the leaves stand out, but generally you leave a margin of seven and one-half to eight inches. I know men who hang closer. After it is hung for several days, then many hang it closer. It is just when the leaf is changing color—it is green when it comes into the shed and the first change is to yellow and from yellow to brown—and it is just while the leaf is changing to yellow that the moisture is going off most rapidly and the greater the danger from pole-burn. There are several other diseases that come in through the winter, but they are not nearly so dangerous. After the tobacco is cured the leaves are so brittle you cannot touch it, so the grower must wait until damp weather comes on. As soon as that comes and it gets moisture and becomes soft so he can handle it without breaking it he takes it down from his shed and puts it into a damping cellar. Under one of the sheds he has a large cellar divided into two parts, the stripping room and the damping cellar. The damping cellar has an earth floor and a very little light. It is hung in there and gets damp, and when it gets so damp that he can take it up without breaking, it is then taken to the stripping room and then the stalks are stripped from the leaves. This is what is called stripping tobacco. The term "stripping tobacco" as used means different things. With the grower it means taking the leaves from the stalk and sorting and tying up in hanks. With the manufacturer it means taking the mid rib out of the leaf. The term "stripping" does apply to both operations. He takes them in the cellar and strips the leaves, and that stem is valuable as a fertilizer. It contains a great deal of potash and I have no doubt about the nitrogen. The farmers apply them to the corn ground.

A Member: Does he apply them in that condition?

MR. HIBSHMAN: Usually in this condition and they are put on in the manure spreader.

Now then he has his leaves stripped from his stalk, but these leaves are not all alike. There are some poor ones in there. The lower leaves of the plant as it grew in the field came in contact with

the soil and they got dirt on them. These are called ground or sand leaves. They are not as valuable as the other leaves and consequently he makes two grades and in one he puts the ground or sand leaves and all torn, broken or worm eaten leaves, and in the other grade he puts the best leaves. So he takes the tobacco from the stripping table and sorts out all the bad leaves. Usually there is about a proportion of one to six or one to eight of second grade or ground leaves to the best leaves in the crop. Then his next concern is to sort these different grades out according to the length of leaves. That would not show any good sorting (illustrating). But where he has a large bulk usually one man strips off and another sorts and several lay out. He will lay the longest back here, the medium in the middle and the shortest one in front, graded up that way, and then reaching at one side he gets a handful, as much as I have here, and he ties them up with another leaf, usually taking a leaf out of the second grade, taking about a dozen leaves and making the ends nice and even. There is a difference. Some growers do it up more carefully than others because in tying up not many growers will make the butts as even as that. You have three to four inches difference in the butt end of the leaves. It shows poor sorting. I think it would pay the growers to tie it up neater. He takes it up and ties it with another leaf. That is known as a hank. Some places a hank is called a hand of tobacco. His whole crop is put up that way. Of course, the leaves are uniform in length, maybe a half inch or so variation. In this condition the grower sells it and after it is done up this way he usually bales it up in bales of 50 pounds and covers the bales with paper. This is the paper used in baling them. They have baling boxes made especially for certain sizes, about 34 inches by 18 inches each way. The paper is wrapped around these bales and they are tied with three wraps. Then it is in that condition that the grower sells it to what is called the packer. Remember this tobacco is what we call green. It would not be fit to smoke. It has the gum on. It has not the color or texture, not at all like the tobacco you find in the cigar shop. It must have good fermentation and sweat in which it will lose twenty per cent. weight going through the sweating and it takes the gum off. This tobacco is sticky. It has the gummy excretion of the leaf which in fermenting is broken up and dispersed. There are not many growers that sweat the tobacco. They sell to the middleman, who does the fermenting and sweating and sells to the manufacturer. And it is done up in hanks like this and tied up in the bales that the grower sells to the packer. Now in Pennsylvania the packer goes from farm to farm and buys the crop. Each farmer is his own salesman. There are some sections where they sell on what is called the block. A farmer may have a large crop and may want to sell at once, and he makes known that Mr. Black will have a public auction. The buyers come there and bid against each other. I believe there they get a more fair price for tobacco than in Pennsylvania, because the packer goes to farmer after farmer and says: "Sell me your tobacco at ten and three. That is all we are bidding and we want your whole crop." "Well, I think I will have to sell for that," the farmer says. And that is the way a great deal of tobacco is sold. It is not bought on its merits as much as it should be in Pennsylvania. That is only the objections in selling. I believe if the grower would do the crop up better he could get better prices for it than he does.

A Member: Could the growers eliminate that middleman by packing their own tobacco?

MR. HIBSHMAN: He could; but a great deal of our tobacco is farmed—I forgot that. When it comes to the first of April—a great deal of the tobacco is farmed by tenants. For instance, you own a farm and the farm will have shedding for ten acres and you only grow five acres. You have not the help. Then you give that out to a cropper, and you supply the manure and furnish the teams and the man does all the labor. The man who owns the land gets half the crop after dividing the cost of the fertilizer between them, so the tenant farmer and the owner share alike in the crop and can sell independent of each other. Besides that we have in Lancaster county a very conservative class of farmers that would be slow to enter into any corporation of that kind. That would be the best way though, and no doubt it would work if the man had capital to grow a large crop and pack it himself.

A Member: Isn't it a fact that many growers as soon as they get in a position to farm and pack their tobacco they become packers themselves and buy off the farmers?

MR. HIBSHMAN: That may be. The difficulty would be to get the people to organize to work it out.

Now you want to know what it has cost to grow this tobacco. In 1908 we kept a record of twelve different farms in the county, and counted the rental of the farms and buildings, the depreciation of equipment, all the expense of preparing and manuring the land, cost of all labor in planting, cultivating, harvesting, curing, stripping and preparing the crop for market, and every item of cost that enters into the production and sale and the average cost on twelve different farms was 7 4-10 cents a pound, and we had an average yield of 1,638 pounds to the acre. On some of the farms they were growing over a ton to the acre, and I remember one farm that averaged over a ton to the acre and the cost of production was 6 4-10 cents a pound, just a cent a pound less than the average for twelve farms and that farmer got out in having over a ton to the acre and he had more pounds and the cost of production was therefore cut down. When I was talking about the selection of seed stock by taking care to get plants of a strain that have a large number of leaves, I was looking to the yield, because the more leaves you get the greater the weight to the acre and that much less the cost of production will be.

A Member: Which is easier cured, the stalk with a lot of leaves or the stalk with not so many leaves?

MR. HIBSHMAN: If you have a stalk with a large number of leaves with short stems, set close together, you will have the greatest trouble in curing because the air cannot draw up between and there is another thing, that is the shape of the leaf. A leaf wide at the heel, at this part, you see when this tobacco hangs in the shed the air cannot get up through there; and there is another thing enters in about that width of leaf. I don't like a leaf very wide at the heel.

By holding up to the light you can see that this part of the leaf is thin and flimsy. That part of the leaf grew in the shade. It does not have the quality and body. It would not make as good smoking and would be more bitter. So in picking a seed stalk we like a stalk that sets the leaves up more. Then the sun shines down through the leaves and shines on the leaves below. We get more leaf surface. I am convinced that in picking a strain that gives a large number of leaves will give a higher yield. I can take you to a farm where this strain of tobacco growing yielded 2,400 pounds to the acre and a type of tobacco that produces a great many leaves where other types do not produce so many.

A Member: What type is that?

MR. HIBSHMAN: Weaver broadleaf.

A Member: The packer condemned it to me on account of the wide heel.

MR. HIBSHMAN: That is one thing I don't like. I do not like too wide a heel because from the packer's standpoint it is not so valuable.

MR. LIGHTY: Will you tell us what the selling price of that tobacco was? How much money you people are making?

MR. HIBSHMAN: I don't know what the average selling price was, but along about ten to eleven cents; along there.

MR. LIGHTY: What is an average yield of a good crop?

MR. HIBSHMAN: 2,000 lbs. to the acre would be a good crop. It cost a little over \$100 an acre to grow that crop. But crops grown larger than this last year. I know one crop, just an acre, that sold for \$250. It would cost just as much grown commercially.

MR. LIGHTY: Making 100 per cent. on the investment?

MR. HIBSHMAN: Just about.

A Member: Permit me to ask again for that mixture of Paris green, bran and molasses.

MR. HIBSHMAN: One bushel of bran, one pound of Paris green and one quart of molasses; all mixed in a candy bucket and put enough water in to get us crumbly, so if you throw a handful down it will break up.

A Member: And the principle is that the cut worm will come on the surface and eat it?

MR. HIBSHMAN: Yes, sir.

A Member: How long will it take to place it on an acre?

MR. HIBSHMAN: It don't take very long. The other evening I got a fellow at it and he was over in a hurry. A man can just walk along.

A Member: Will it yield more money on an acre of tobacco or potatoes?

MR. HIBSHMAN: Well, there is a different proposition comes in there. You can make more on tobacco here than on potatoes.

MR. A. P. YOUNG: There is a question I would like to ask. He spoke of cotton seed meal as being a very good fertilizer. I want to know whether that cotton seed meal is used directly or whether it is fed to the stock in the stable and then used?

MR. HIBSHMAN: It is done both ways, but where we use commercial fertilizers we use it direct. On the experimental plot, for instance, last year I used it direct, and South Carolina rock, 14 per cent., and sulphate of potash.

A Lady: Do you know anything about putting carbolic acid in the water and on the ground for cut worms?

MR. HIBSHMAN: I have heard of that, but never tried it. I don't approve of it.

A Lady: We tried it and seemed to have good results.

MR. HIBSHMAN: I heard of some cases where it worked all right. I heard of a great many cases where it did not help at all. If you get rain within a day or so it carries it off the field. When dry it carries a great deal of acid and would kill the worm and would keep them away from the plants until the smell got away. Where the bran, Paris green and molasses attracts them and the cut worms eat it.

The CHAIRMAN: We will now take up the last number on the program for this afternoon, "Market Gardening," by Mr. M. H. McCallum, of Wernersville, Pa.

I now have the pleasure of introducing Mr. McCallum to you.

Mr. McCallum then presented his paper as follows:

MARKET GARDENING.

By M. H. McCALLUM, Wernersville, Pa.

Mr. Chairman, Ladies and Gentlemen, and Fellow Institute Workers: It gives me an exceptional pleasure this afternoon to speak upon the subject that has been assigned me, namely, market gardening. While I cannot upon this subject give vent to my greatest enthusiasm along agricultural lines, yet I have always had a great

interest in the growing of vegetables, and a good reason, no doubt, is the fact that I was born in the vegetable garden, brought up there, and have ever lived there, and the end seems not yet. The subject is an immense field and I shall consider briefly only some of the outcroppings with an eye single to the interest of the market gardener.

If the man who believes that in agriculture the best opening lies along the line of market gardening he should recognize early the importance of adding to what he already knows, whatever scientific knowledge and training he may be able to secure. It is hardly necessary to say that the chief object of every gardener is to make money. But in gardening as in every other business the most successful are those usually who have best knowledge of their undertaking. The more advanced and complete are his ideas the more successful will be his work. The more he knows the more he can do. We need forethought in all lines of agriculture, but when we are wanting in this respect in the market garden we fail most wretchedly, for the market gardener must show more knowledge, care and attention than does the general farmer who raises only the staple crops. The most successful market gardeners are men of high and definite purposes and are never satisfied with ordinary results. They are men, who read and they are men who think. Market gardening can be made a very delightful, profitable, and all desirable vocation, but on the other hand it can be made and is made by many these days a slavish life of drudgery—men and women eking out a wretched existence, simply, either because they are not putting brains into what they are doing, or by force of habit have no desire for recreation or self-preservation. It has been said by a successful tiller of the soil that a man should be so resourceful as to be able to spend one day of the week sitting on the fence and watching his crops grow, and by another who adds that that day should not only be Sunday either, but a week day as well, and perhaps they are right. Anyway, I believe a great need of the average gardener today is more and better knowledge of the principles underlying successful gardening, the use of scientific facts and the result of the experience and investigation of other gardeners and experiment stations.

One of the simple things in the practice of the gardener that is invaluable is the keeping of a diary, and from this diary kept from year to year formulate a calendar or record of time of planting and seeding the various crops. The farmer has but a few crops to plant and so has the dates well fixed, but with the trucker it is quite different, there are very many plantings to be made and each as important in point of time and season as any farm crop dare be. And there are the various successions that have to be noted. All this is confusing unless there is something to guide. There is a season when a gardener can think and plan at leisure. He should then make definite record of plans and purposes. This with the time of seeding and the various successions should be conveniently displayed; giving valuable assistance at a time when time itself is at a premium.

Every gardener before he can hope to make a success must be thoroughly alive to the best methods of production. The soil in the first place is no small factor. The gardener should know his soil; its likes and dislikes. He is very likely, in the early spring, through

enthusiasm and over-anxiousness to have an early start, to be unwilling to await proper soil conditions. The working of soil at such time is harmful and cannot be remedied the entire season. He should direct every effort to securing the best kind of a seed bed. The great importance of good tilth has always been appreciated by practical men, and experience has abundantly taught us that care should be exercised in bringing the seed into perfect tilth before receiving seeds or plants. Seed placed into mellow soil will allow the roots to grow unhindered in any and every direction in search of moisture and plant food, and it is this intimate and close contact of the absorbing surfaces of the fibrous roots with soil particle that nourishes and sustains the plant. Again, the fact remains, that unless there exist proper soil condition he may lavish upon the garden spot all the plant food he pleases and there will not be the results desired. Soil for the garden should not bake and crack, or run together and puddle after rains. But how are we to secure the proper physical condition? The crying need of our Pennsylvania farms and gardens to-day is more humus. We are preaching it and yet it is being used twice as fast as supplied. Gardeners living near the cities can often supply this cheaply in the form of stable manure, while it remains for the other fellow to resort to green manuring. However, he has not need of being discouraged. Green manuring is a well know fact, but its importance is by no means appreciated. Every inch of the garden should be wintered with some cover crop to furnish organic matter, and to save from leaching the available plant food, and also in case of a legume to furnish nitrogen. Crimson clover and cow-peas may be grown to advantage in some parts of the State. Rye and hairy vetch are more appropriate because they can be sown later. Then rye may be sown as the last resort; say 3 to 4 bushels per acre.

However, in this connection it might be well to say a word about lime. In turning down these green crops he should not overlook the use of this important element to correct acidity. It seems we use too little lime in our market gardens anyway. Manuring heavily from year to year necessitates liming as well to keep the soil in good sanitary condition. In visiting market gardeners through Philadelphia county last summer I was very much impressed with what benefit a little lime would be upon some of those garden spots. While being shown over one of these large plantations I was told of a certain field that was not doing its duty, and as we approached and noticed conditions I could not help but feel that a little lime would do it good and so suggested, and the point was well taken.

In further consideration of the soil as a factor in successful production we must not overlook the act of cultivation. This is an all important operation and must be done at the proper time if the crop is to be kept free from weeds and in a good growing condition at the least cost. It is important to keep the soil well stirred both to conserve moisture and dew-elpe plant food. There are times through the growing season that if this is neglected only for a few days it will result in considerable loss.

Every crop from seeding and planting time until harvesting must be watched with an eagle eye. The method employed in producing certain crops successfully last season may have to be modified in

growing the same crops this season. Insects, pests and fungus diseases require no little vigilance, and we must know how to meet them and be ready to meet them. Rotation should be carefully observed. Aside from many other benefits it means renovation. This fact was forcibly brought home to me several years ago in taking hold of a large garden where rotation was regarded of little consequence. And of all the diseases, insect pests, maggots and what not, made me almost feel like giving up in despair. But the following year we sought refuge in another location, practiced rotation and eliminated many former troubles.

It goes without saying that to produce bountiful crops and crops of quality and appearance we have to fertilize heavily, and stable manure is the truckers great stand-by. And yet as cheaply as this may be placed upon our gardens, I believe that an intelligent use of commercial fertilizer is profitable. And the gardener should be his own mixer. He should experiment with the plant food elements singly and in combination upon the crops that are his money makers. It may be a little easily available nitrogen will do wonders, especially in the early spring when nitrification is not active. Taking the average of 18 or 20 of the main garden vegetables, and we find that manure as it comes from the stable is practically a balanced ration for them. And yet experience teaches us that an application of phosphoric acid in connection with the manure is greatly beneficial. We may find too that potash will be helpful upon some soils and upon certain crops. And so for the man who uses commercial fertilizer, there is no reason why he should go it blindly. Let him ask intelligently of the soil and it will respond through the various crops with all the aptitude of nature.

Another factor that is altogether vital in the market garden is the seed proposition. Its importance cannot be too strongly emphasized. Men of experience can trace many a crop failure to the purchasing of bad seed. There are many discouragements to encounter in the market garden, but not a few are offset by taking the proper precaution at this point. The mere fact that seeds germinate does not tell the whole story. I know a gardener who set two acres in cabbage and at harvest time there were good cabbages, brussel sprouts, cauliflower, and everything between. Whatever seeds have to be bought should be bought early. Have nothing but high grade and be willing to pay well for them. Most growers have a few kinds in which they are especially interested, and are selected with more than ordinary care. It is desirable to obtain from such a source all seeds of crops in which we specialize. However, it seems to me the gardener should practice the selection of seeds more than he does from his own plantation. Some few seeds such as cauliflower are best purchased from a reliable source. He cannot produce such seed profitably. But with such crops as sweet corn, cabbage, onions and tomatoes, etc., there is a vast opportunity for improvement. It is right here where the gardener with a little skill and care can raise a peg or two by selecting choice seeds and improving the strain from year to year. He should have his ideal and select upon merit. Close attention along this line will be amply rewarded, and give satisfaction.

Again to be successful the market gardener must be thoroughly alive to the best methods of selling and distribution. For it is at

the market end that skill counts for most in securing maximum profits. And he who is wise in producing and likewise apt in disposing of his product we will term a successful gardener, for these are two qualities not always found in the same person. To produce is one thing, and to sell another. Many succeed admirably in the production of vegetables, but fail at the profit end because of inability to market. They fail to see the force of appearance and condition, and attractive receptacles. Their grading may be defective. First class goods may not be strictly first class. Size, shape, color and soundness are not properly regarded. Attractive appearance catches the eye and goes a great way in clinching a bargain. Then there is the other fellow who can usually sell to advantage whenever he has anything, but they are often such that like to sit on the fence and not alone watch the crops grow. The vegetable garden is not the place for a world of ease, by any means. It is no business for the careless, the lazy or the stupid. Its occupant must be ambitious and not afraid of hard work. He should never know where to place that which he grows, and grow that which he is possible to place. We must cater to the wants of the public, and yet be original enough to create a market where this is possible. Start in moderately to fill a want existing. Try to have your vegetables upon the market a few days before your competitor, keep your goods from the consumer's eyes. Study the market, the demands of certain articles. Educating the peoples' tastes for certain goods is a slow process. Quality may sometimes have to be sacrificed for outside attractiveness. Aim at uniformity of bunch or package, and cleanliness. Endeavor to establish a reputation by inspiring confidence and reliance in all you say and do. Retailers like to deal with growers whose word is as good as gold. Abide by that trite saying "You see top you see all." My experience has seldom gone so far as the middleman, and yet as dealing directly with the consumer the best policy always is honesty. In gardening as in every vocation in life there are many uncertainties, but one of the sure things is that your sins will find you out.

Deputy Secretary Martin then announced the program for the evening.

The CHAIRMAN: We will now stand adjourned until 7.30 o'clock this evening.

Thursday Evening, May 25, 1911, 7.30 o'clock.

Mrs. Sarah B. F. Ziegler in the Chair.

The CHAIRMAN: The meeting will please come to order.

DEPUTY SECRETARY MARTIN: It was our intention to hold a session to-morrow morning when the Resolution Committee would be ready to report and their report be acted upon. It seems that a goodly number of the members desire to leave this evening for their homes after spending the entire week, leaving their homes early on the Sabbath on important business, and before taking up the regular

exercises of the evening we will hear the report from the Resolutions Committee. Mr. Joel A. Herr, Chairman, will please make that report now.

The report of the Resolutions Committee was then presented by Mr. Herr as follows:

REPORT OF THE COMMITTEE ON RESOLUTIONS.

Memorial.

Since our last meeting at Butler, Pa., our ranks have been reduced by the demise of the following Institute Managers and Lecturers, viz:

Hon. Jason Sexton, of Montgomery County.

Hon. Charles Miller, of Snyder County.

Hon. E. S. Hoover, of Lancaster County.

D. W. Lee, of Bedford County.

Hon. Jason Sexton was stricken down by disease while making a Memorial Address in his own county on last Decoration Day. He was a veteran of the Civil War, having served for four years in the Union Army. He was a prominent and strong lecturer on the Institute force, a Member of the State Board of Agriculture and Manager of Farmers' Institutes in his county for many years. He served his county faithfully in the General Assembly for three terms. His life was a type of the highest Christian citizenship and his name will long be remembered and revered.

Hon. Ephraim S. Hoover died June 11, 1910, aged 74 years. In early life he taught school but poor health induced him to take up farm work and for many years he carried on farming successfully. His county honored him by electing him a Member of the Legislature. He was also a Trustee of the Millersville State Normal School, Institute Lecturer on farm topics, Assistant County Manager of Farmers' Institutes and also held a number of other positions of trust and honor. He had a wide acquaintance and was a much honored member of his community.

Mr. D. W. Lee died at his home May 3, 1911, of tuberculosis. He was a man of more than ordinary intelligence, a man of temperate and industrious habits. Mr. Lee was a veteran of the Civil War, serving his country honorably. He was a Member of the State Board of Agriculture and County Chairman of Institutes at the time of his death.

Hon. Charles Miller, who died since our last meeting, was for many years Manager of the Farmers' Institutes in his county. He served his county with credit in the Legislature and was a citizen of the highest character and was held in general esteem by his fellow citizens.

We desire to express our sorrow at the death of these our fellow workers and extend our sympathies to the bereaved families. We ask that these testimonials be spread upon the report of the proceedings of this Institute.

We desire to express our appreciation of the warm reception accorded us by the people of the City of Lancaster, and therefore resolve:—

1st: That our thanks are extended to Mayor McClain for his earnest words of welcome.

2nd: To our co-worker, Mr. J. Aldus Herr, and his associates for the complete arrangements made for our comfort and pleasure while here.

3rd: To the County Commissioners for the use of the Court House for our meetings.

4th: To the able Lecturers, who have instructed us, for their able addresses.

5th: To Director Martin for his successful efforts in making this one of the best sessions this body has ever held.

J. A. HERR,
J. H. SCHULTZ,
J. ALDUS HERR,
W. F. BIDDLE,
L. W. LIGHTY,
Committee.

DEPUTY SECRETARY MARTIN: You have heard the Report of the Committee on Resolutions. Are there any remarks?

MR. CLARK: I move that the report be adopted as read.

The motion was seconded, put and agreed to.

MR. DORSETT: Before we take up the regular program for this evening I would like to bring one more subject before this body and do it briefly. One of the most important subjects perhaps before the farmers to-day is that of co-operation. I have been unable to attend all these sessions but I have been attending an important meeting on co-operation in New York City; one also on parcels post; and on my way in took in the Milk Show. This is what I would have done: I would like this body of institute workers and county chairmen to consider this subject of co-operation, and for that purpose I move that a committee of three be appointed on co-operation and that they are to investigate the ways and means to secure co-operation between the farmer and the consumer and report at our next meeting.

MR. BLYHOLDER: I second that motion.

The motion was put and agreed to.

DEPUTY SECRETARY MARTIN: I shall appoint on that committee, Mr. Dorsett, of Tioga; Mr. Kester, of Clearfield and Mr. Billings, of Erie counties.

The CHAIRMAN: We will have a Ladies' Session now and owing to the lateness of the hour I will ask the speakers to confine themselves to forty minutes talk. The first speaker of the evening will be Miss Sara Phillips Thomas, of Philadelphia, who will talk to you about "Gleanings from Other Countries." I think you will find this talk very interesting. I now introduce to you Miss Sara Phillips Thomas.

GLEANINGS FROM OTHER COUNTRIES.

By MISS SARA PHILLIPS THOMAS, *Philadelphia, Pa.*

Mr. Chairman, Ladies and Gentlemen. To-night I wish I had been asked to speak on "What is the Matter with the Men of Pennsylvania," because this thought has been going through my mind very much for the last few days and weeks, and when I realize that we have 600,000 men members of the great churches in this State is it any wonder that we are really trying to do something for the childhood of our State to stimulate a better manhood and womanhood. I ask why you men of Pennsylvania put such a low valuation on the expression of your citizenship; why you do not send men to Harrisburg, when you have it in your power to control the balance of power in the Senate and House of Representatives, men that are men, that are stalwart men, that will not only make us good laws but stand for the upbuilding of the State and the protection of the home; and I appeal to you to use your votes in this way, to use your influence over the other Christian men of this State.

And now to-night we are to realize that there are many ways in which we get our education even after we leave the scholastic halls of learning, and I think you will agree with me that as long the earth exists that we must go on in seeking knowledge and enlarging our sphere, and one of the pleasantest ways by which we can do this is by means of travel and if we are fortunate enough to get into the old countries beyond the seas we find a splendid opportunity to study life, art and history, as well as to enjoy the natural scenery everywhere around us; and I am going to ask you, in the limited time I have to-night, to take a rambling trip with me and I will start with you in that magnificent harbor of Queenstown, and I ask you to picture that old town on the height above the harbor with a perpendicular wall of about 80 feet rising from the water's edge and high above that you find terrace after terrace planted with beautiful shrubbery and flowers. We landed in this town about 2.30 o'clock in the morning and at 4.00 o'clock the day had dawned and so it occurred to me that we might profitably use our time by taking a jaunting car ride and for some of you who are not familiar with a jaunting car I will describe it. It is a vehicle that carries properly four people and the driver, but the great advantage is that you can pile in any number and use but one horse to it. It has seats that run lengthwise over the wheels and the reply that the driver made to me when I asked him about the ride, he said: "Oh, yes, miss; it is a fine thing to do. It will shake your breakfast down and shake your liver up." And so it will if the jaunting car is not properly balanced because it is one of the roughest vehicles if you do not have your load properly balanced. We rode around the streets of Queenstown and felt transported into fairy land as we looked upon the liburnum, which as many of you know belongs to the locust family, with long festoons of yellow plume and as we looked up into it was one mass of golden beauty; and then

aside from the liburnum the rhododendrons in the very prime of their beauty and the pink and white hawthorn hedging the fields, and then, too, the native goose or wind which is found in England and Scotland and covered all the hillsides and meadow lands, and as we left Queens-town and hurried on to breakfast in Cork we enjoyed the magnificent beauty of this mass of yellow bloom as we looked from our car windows. In Ireland in striking contrast to all this natural beauty—but in contrast to all this you find the most abject poverty that I have ever seen and you find dunning behind your vehicle the little urchins begging as long as their breath holds out and you hear them saying: "Copper, sir; copper, sir;" until they can barely lisp it.

I am not going to ask you to stay in Ireland more than just to take a peep into the country fair and realize the way they handle their stock in the markets. Once a month the country folk come in with their cows and pigs and their children, which of course they do not sell, but the livestock are brought for sale and they congregate in the commons and opens and have a good social day of it as well as a profitable market auction.

Then I am going to ask you to leave Ireland and travel across Scotland and up on the highlands and view the historic parts of Scotland. Let us just pause at the Island of Ionia that Robert Louis Stevenson has made so famous and as we visit the battle fields remember the stirring incidents of their time and all through we find an association of history that gives a keener appreciation of the natural beauty of the places. It may be interesting to tell you that while I was in Scotland I met there in Edinboro during the World's Missionary Congress our great American orator, William Jennings Bryan, who was the great orator of that occasion. I was also fortunate enough to be a fellow passenger on the steamer with him in crossing the ocean. The morning after Mr. Bryan spoke in Edinburgh the thing that interested me very much was the way the British papers spoke in regard to it. Something like this appeared in the morning papers. As you probably know, there was a limit of seven minutes to each speaker. Even to those men who had spent ten years in gathering information to present to that great congress was allotted only seven minutes to give the results of their investigation. And the papers said that in the seven minutes at the beginning the Britisher would begin by apologizing for the very little that they can say in seven minutes while at the end he would be found apologizing for the small amount he would say in seven minutes. While the American would begin by saying, "I want to tell you such and such a thing," and by the time he had reached the middle he had covered half of his subject and when he had finished there was nothing left to say upon the subject. So I think it is remarkable that the Britishers who have a good opinion of their own people and their own oratory should pay the Americans such a compliment as that in their local papers.

The country I want you to travel longest in to-night is Norway. We find a country not as much travelled as some others and so very different from our own in appearance, in agricultural points and contrasting effects that it brings particular interest to the American tourist. In the southern section of Norway we find mountains and waterways and as we travel on the little boats and look up at the mountains we have a feeling that there is nothing beyond the horizon

line, that the world stops with the mountain top and if we were to reach that particular mountain top I am sure we would have the same feeling that there was nothing beyond the horizon line of the next mountain, so closely are they hemmed in together. So you can realize that there is little tillable ground in the southern section of Norway. The farms or *Sagties* as they call them are principally on top of the mountains. In the early spring they send the cattle up there to pasture and they send with them their *saaler* women or girls and leave them up there the whole summer long and you can imagine it is a desolate sort of existence. They have a trolley wire that comes from the mountain top to the base upon which they send the milk down from the mountain to be taken to market and also send up stores and provisions for the women who live up there through the summer. They have small farms scattered along through what we might call their valleys and they get the grass off the hillsides. We could hardly recognize it as hay because largely made up of weeds and ferns with possibly a spear or two of grass. They cure their hay in a manner entirely different from anything we see in this country unless we happen to go in sections where Norwegians have settled. They call this method of curing hay "*haas*." It seems as they took bean poles and planted them two feet apart and connected them with light lumber and put their hay up over this rack until cured, and you can imagine as you pass over the country that these racks present a very curious appearance. They do this partly on account of the small amount of grass in one place but more because of the heavy rains they have and the dews so that the ground is not dry enough most of the season to be able to cure the hay on it. The sun is hot and the hay will cure in a few hours when prepared in the manner described. It is of interest to you to realize that there are 30,000 more Norwegians in the United States than in Norway and because of this fact we find people speaking English through a great many sections of Norway. We often find that the girls have gone over to the United States and then gone back into some of these inland sections and opened a hotel for their fathers on the American plan. We find sometimes the American ways being introduced but not in very many sections and some of the men who drove us spoke of the fact that it was very hard to get a Norwegian to adopt a different system of work from that which they had and if I recollect rightly they told me they began to work at seven o'clock in the morning and then worked for an hour and then left off for an hour and again began at nine o'clock and worked until twelve and then rested for two hours until two o'clock and then worked until five and then stopped until seven and then, as I remember, worked until nine. Maybe that don't count up quite right. They fix the hours to suit themselves. That gives you an idea of the way they perform their day's work instead of going at it and getting through with it as our American man does. The method of transportation is interesting. When I tell you that during the month I was in Norway I was but three times on a steam railway you can realize that we did not travel in a hurry. Most of the travelling is by the *stulkjaare*. The *stulkjaare* is a two wheeled cart with a seat in front for two people and behind a seat for one on which the driver sits. They drive in this the little horses which are native to Norway and weigh from 700 to 800 pounds. They cost in our money about \$125.00. The *stulkjaare*

you can purchase from \$35 to \$40. This is really the earning capacity of the farmer or the implements that he has to use to make his living with.

These little farms that you find through the country sections possibly you could get two and maybe four of them in this room so little are they. You can realize from such a small plot of ground that the farmer cannot make very much to keep his family on; so with his horse and stulkjaare he has something that he can earn a living for his family with and it has been a Godsend to the Norwegian that the tourist has taken to travel in his country more and they do not hesitate to say that their country is much better financially than before the tourist came there in numbers and so it is fair to say that one of the chief industries is catering to tourists and he does this largely with the stulkjaare. He gets about \$3 a day for travelling with his horse and for his own wages. The country is subdivided into two sections and each section has its own station where there are a certain number of horses required to be in order to accommodate tourists and I suppose you have already grasped the idea that everything in this section is of the most primitive kind. The farm houses of the Norwegians are nothing but huts with turf roofs on which is placed the turf and you see the grass growing on these turf roofs from eight to ten inches high which presents a rather picturesque appearance. In contrast to this primitiveness we are rather surprised to find that they have a systematized travelling scheme and each farmer is required to send his horse into the various travelling stations so that there shall be a sufficient number to accommodate the tourists as the demand increases. They have this system so well regulated that each man knows exactly over what territory he can drive, the number of miles or kilometers he can drive so that one does not interfere and get into the territory of the other, so that there is a perfectly amiable arrangement. We find the country subdivided into sections very much as our states are subdivided into counties and each section has its own customs and costumes. The people in the various sections wear one particular costume, and this makes me think of one of the institute workers who tells a story of how the farmer's wife is abused by having to send to the neighboring town to buy a spring bonnet. The horse was so slow that by the time she got back the styles had changed. This does not effect the Norwegian woman, because the styles never change. They wear the same style of dress in all its details from generation to generation. I have here, which possibly you can see, the dress of the Norwegian girl and the young women and I have also the dress of the man and the boy in the Hardangar section of Norway. I would like to say that the men from the old countries do much more to contribute to the picturesqueness of the country than do our American men by wearing these attractive costumes. We find the young girls wearing a knitted zeyplucoil which goes over the hair; and then we find the next older girls wearing a cap like this and this corresponds with the same costume that I have shown you on this little girl and they wear a red jacket such as I have here. Then when the woman marries she wears a head arrangement something like that and when she becomes an older married woman she wears a black one. I think you American men would be glad if there was some way you could tell the ages of the American women

as quickly and nearly as they can in Norway. The bride wears a crown of metal. She wears it of silver or brass if she is fortunate enough to have enough of worldly goods to own such a one; if not, she wears a material that looks something like brass and is interwoven with bright colored strands and this is handed down from generation to generation. She wears such a streamer hanging down from her waist and then when married she wears two. We go into another section of Norway and we find a costume like this. We find this in the Hollingdel section. It is the most beautiful costume to see. The cap I will put on so that you may have a realization of the way they wear them, because the Norwegians seem to understand the ways of coquettishness. We find in Norway most of their implements are wooden and a great many of them are artistic. We find some of their utensils are carved most attractively and one of the wooden things I have here in my hand that represents an old time custom of the Norwegians is a bridal spoon. This is carved out of one solid piece of wood symbolic of the union of the man and woman and at the breakfast feast the groom eats out of the one and the bride out of the other and it is very beautifully carved out. We find as we go up to the central part of Norway that we come into a more fertile section and we sometimes see agricultural work done in a way that reminds us of what we do in America. We see them gather the hay in much the same way as we do. And farther north we find still a more fertile country. In the northern section we find a great many Laplanders. There are about 30,000 Laps in Norway. About 3,000 of these are sea Laps who are better off financially than are the field Laps. When we went on north and landed at one of their northern towns called Tromsø we were greeted by a curious lot of people, a dirty set of people and one feels the people should be fumigated or you keep your distance. The women carry their babies much as the Indian does the papoose and they make caps and dolls for sale. The men carve many things out of bone, pipes and knives, paper knives and spoons, and it is a matter of interest that one of the chief industries of the Laplanders is raising and killing reindeer. The meat is really quite palatable and we had the pleasure of eating it but once at it was out of season, therefore tasteless. One of the men said he was going to begin hunting but would not have reindeer meat by the time he got home and I said: "Why not?" and he said: "Because it costs so much that I will sell it before I get home." I have in my hand a spoon. In this spoon are five little rings. Each ring represents 100 reindeer that this man has killed; so for every 100 reindeer he kills he puts one ring in his spoon. I wish I could convey to you some idea of the beauty of the lights of the midnight sun. It is almost impossible to give you any idea of the wonderful lights and colors that the sun produces in that northern section where they have their days lasting two and one-half months and their nights of corresponding length; and in all that twenty-four hours there is no suggestion of darkness. One does not know by the light when it is time to sleep or when it is time to be awake and surely the tourist seems to be infected, as the native seems to be, by spending most of the twenty-four hours where he can see the beauties of nature round about him. The first night that we had on the North Cape summit made almost the greatest impression of any upon my

mind, though that was not the grandest exhibition of lights and colors. At 11.30 the sun set and at 12.30 it rose and we saw the lights of the sun set and sun rise side by side in the cycle and it seemed to give me a greater realization of what it meant to realize that the sun did not set in the sections when we got a little farther north. I am going to take the trouble to read a little extract from my diary that may give you a little idea better than I can give it to you now because I wrote this when the freshness of the impression was upon my mind of the lights and colors as they presented themselves to us in that northern section.

I have but ten minutes time longer to speak to you and I am going to leave you with this picture if I have been able to bring one of you to the land of the midnight sun and I just want to tell you before we leave that when we are on the North Cape we started out at 10.30 and we desired to reach the top of the North Cape which was about 100 feet above the mountain so as to see the sun burst, the flash of glory from the top, but we were unfortunate enough to get into a heavy fog just as we reached the top, but sometimes I think that was a blessing that we could see such a wonderful sight as we did from the top of the Cape even if we did not enjoy the glory of the sun. In just about a minute the fog rose just as if a magic hand had drawn the curtain and there below was the land and the islands and our little boat moving around in the sea and beyond and up above was the line of the sun and then just as it lasted a minute it seemed someone gradually pulled the curtain over and there was nothing beneath us at all.

Now let us go quickly into that vast territory of Russia, one of the largest countries in the world and one of the countries in which you find the greatest accumulation of wealth, the wealth of all the churches and palaces and in everything that pertains to the government, but nothing spent upon the common people; nothing even spent in the way of sanitation and no country needs it more than Russia. We cannot help but be impressed with the strange contrast between the luxury provided for royalty and absolutely nothing for the large mass of the common people. I went through their palaces and we saw doors lined with solid gold; we saw hundreds of plates that were worth from \$30,000 to \$40,000. They had been presented to the Czar by different people, gracious municipalities and various sections of the country and there were numbers and numbers of these in many of the palaces all through Russia. And one thing that seemed to be different or made more impression on my mind was that they took large numbers of peasants through these palaces and these plates I speak of were always placed in large panels and had a red curtain covering them and likewise their gold doors were covered and when the peasants went through they were exceedingly careful that they did not get a glimpse of this wealth that they were glad to show to the tourist. We had the opportunity of seeing the people congregate at the church festival and if I were to describe a Russian costume it would be a conglomeration of color something like this: a green skirt, a yellow apron, a red shirt waist and a pink kerchief. So you can imagine the combination that you see there. They don't seem to appreciate harmony of colors. It is the common people that I am speaking about. The peasant people

are the ones that contribute the interest to the tourist, because in the cities we see people just as we are accustomed to see and dressed much as we are accustomed to seeing. We found one thing in the churches, the Greek Church of Russia, which interested us very much and that is their "ipons" which are similar to the painted images we find in the Roman Catholic Church. They are made of gold and silver and inlaid with diamonds and precious stones. We found a great immense amount of wealth put into some of these single ipons and in a procession we were able to see we counted somewhere upwards of 100 ipons carried through the streets, and in Moscow in one of their oldest chapels, the Iberian Chapel, you find an ipon brought many centuries ago from Iberia, which is taken out when sickness or any occasion calls for it and placed on wagons drawn by six horses and taken through the streets to the house where it is desired to come to and in the meantime, of course, a painted copy is put in the chapel and this is supposed to take away the disease or whatever it is that the particular people in the house are afflicted with. It is a matter of interest that this particular ipon is the one that the Czar, who is the head of the Greek Church, and all the dukes and various prominent members of the royal family come first to worship. We find great quantities of the most beautiful, marvelous and precious stones in Russia and we had the privilege of visiting the royal granite works and I have never seen such stones in such quantities as we saw there and the most wonderful carving in stones possible to imagine. In my hand I hold one of the choicest of the Russian Marbles and the tomb of Alexander II, the liberator of Russia, is made of that marble. You will recall that this particular ruler was assassinated in 1888 and you will remember that it was a girl that by throwing a handkerchief to the street gave the signal to the student who threw the bomb and that Alexander was not injured in the throwing of this bomb and he got out of the carriage to see what assistance could be rendered to the injured and the second boom was thrown which fatally injured Alexander, and this is one of the reasons why the Russian common people are held under suppression because of the dreadful assassination of this particular ruler who was doing everything in his power for the people of Russia. And on the spot where Alexander fell they built a memorial chapel and it is one of the most magnificent chapels that it is possible to imagine. This chapel has some of the most expensive ipons in it.

I want to say that in Russia one finds better sleeping car arrangements than we do find in America. While we find some things most primitive in contrast to that, we find everything that caters to wealth there and in the five nights that we rode in the sleeper in Russia we were much better accommodated than if we had been in American sleepers.

The Russian language is a most difficult one to understand. They have so many letters in their words that people cannot understand what they do with them. I hold in my hands the Lord's prayer written in Russian on this and if you would write the Lord's prayer in English in corresponding sized script I think you would find that it would not cover half this space. There is not a word here that bears any resemblance to my Lord's prayer. And when you travel on the streets I want to say that the droskimen and their droski wagons

are features that contribute much to the interest of the tourist. These wagons are drawn by horses wearing large wooden collars over their necks from shaft to shaft.—But the Chairman says I cannot take you any further in Russia to-night. (Applause).

The CHAIRMAN: I am sorry we cannot go any farther with this subject but the time has elapsed and we will now take up the next subject on the program, "Farm Sanitation," by Mrs. George E. Monroe, of Dryden, N. Y. I now have the pleasure of introducing Mrs. Monroe to you.

Mrs. Monroe then presented her address as follows:

FARM SANITATION.

By MRS. GEO. E. MONROE, *Dryden, N. Y.*

For many years the Institute effort has been directed toward the care and feeding of the farm animals. Dairymen and poultry men have really succeeded in bringing about great improvements. Recently it has occurred to us that what was good for the animals in the barns, might with profit be applied to the persons living in the farm homes.

The death rate from serious contagious diseases like typhoid fever, tuberculosis and many others, is as high in the country as in the city. This ought not to be.

There are three things necessary to good health. 1st: Fresh air and sunshine; 2nd: pure water; and 3rd:—and this largely depending upon the first two,—keeping the seeds of disease out of our bodies.

Consumption, which causes the death of more persons than does any other disease, needs only for its cure and prevention—pure air and sunshine, with nourishing food; while the dreaded typhoid fever is a water borne disease. During the day more or less fresh air is admitted to our homes from opening doors, but during the night it is too often carefully excluded. Since we spend one-third of our lives in bed, we might with profit increase our contact with fresh air and improve our health without interfering with our comfort. No one enjoys having the wind blow on them through an open window. But by covering the outside of the window with muslin, or covering a wooden frame which fits under the lower sash of the window, one can enjoy fresh air without any discomfort. Ventilation is fresh air without drafts. Try this method of obtaining it. The muslin should be a trifle heavier than cheese cloth. It will not lower the temperature of the room more than two or three degrees. Besides pure air heats easier and pure air remains warm longer than bad air. If the muslin is unbleached it will not wet through. In regard to the water

we use for domestic purposes, it is not enough that water should be odorless, colorless and tasteless. It must prove to be pure under the chemists test. Our bodies need large quantities of water inside and out. The body is truly a system of canals, and should be flushed daily. Five pints of water is none too much to drink daily. It is better than pills. Try it.

Time was when our country was new, that water from any stream flowing through the farm was safely used for domestic purposes. Now some streams are so foul that fishes cannot live in them. Now the unfortunate dwellers in cities are often obliged to use such water but we on the farms should not do so. A spring in a virgin forest may be pure, but any spring is only as pure as its surroundings. It should be built up with cement at least a foot above the surface of the ground to keep out the surface drainage water. At present the all but universal source of our water supply is some form of well. The dug well, is dug just deep enough to get water, laid up with loose stones or bricks, and covered over with planks which dry and warp in the sun and rain, leaving cracks which admit to the well, surface water, dust and filth which may be near. A dug well should be cemented up inside 6 or 8 feet from the top and a cement cover and curb built to protect it. Probably the safest source of water on the farm is a driven well, deep and well cased to protect it. If there is within 100 feet of any source of filth is contamination there is danger to the water. Slop holes, manure piles, and outside open vaults are a menace if near the water supply.

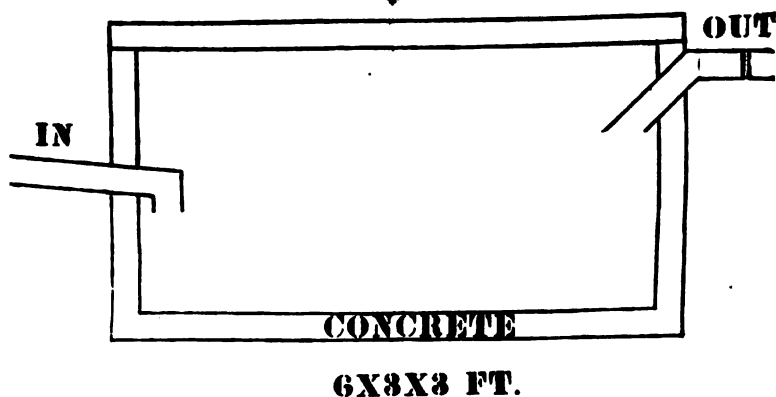
While seeds of disease are carried into the body by air and water they are also carried by the common house fly. He is called the filthy fly, the typhoid fly. Certain it is he is the most dangerous animal on earth. The more one knows about his habits, the less one likes to speak about him in polite society. He breeds in filth; he lives in filth, and, unfortunately, he eats the same kind of food that we do—but we eat at the second table. He flies back and forth from the slop holes, the manure piles, the outside open closet, into our homes where he alights upon the fruit and food prepared for the farmer's family. He is responsible for the spread of many diseases, consumption, typhoid, bowel diseases of children, and the list is long. Fortunately he never goes very far from the place where he is born, so if we remove all filth from around our homes we will do away with the pest of the house fly.

On many farms it is common to find the water supply for the barns either pumped by windmill or engine or piped from distant springs, but no provision is made to supply the house with water, for bath, toilet or kitchen sink. The farmer is willing but he says, and truly, that there is no sewage system in the country, and he can not dispose of his waste water, and what is the use of putting water in the house if he can not take the sewage out beyond the cellar walls. The old style cesspool, made by digging a pit in the ground and stoning it up without cement, is a menace to health and life, and poisons the soil for long distances. If the water supply comes from a well, it may poison that, the leakage from the ill-smelling, disease harboring outside closet may reach the well water. Even if the surface of the ground slopes right, that is no reason why under ground the water runs right. So you see our homes must be provided with

water supply and not depend upon wells. It will cost \$100 more or less to put in a system of plumbing, including hot and cold water in the kitchen sink, the permanent bath and the inside closet. The cost depending upon the size of the house and how much help can be given the plumber.

Now the waste waters could be easiest disposed of by turning it into a stream. There is a slight objection to this. It is against the law, and is not allowed unless the State gives permission, this is usually denied. If one small home could and did turn the sewage into a stream others would want to. If the stream is used for domestic purposes further down, the sewage might cause an epidemic of disease. One house might cause 5,000 cases of typhoid. We are too civilized to do this, then what shall we do? We will build a cesspool that will hold all the sewage until it is purified. It should be built in porous soil near the surface of the ground, so the outlet will pass through the first foot of soil, the upper layer of soil being more open and contains more bacteria. The garden is a good place to run the outlet pipe but right under the sod of the lawn is the very best place.

FARM CESS POOL.



This cesspool will cost about \$5 if the farmer can build it himself, and will require 1 load of farm stones, not too large; one load of gravel, not too coarse; and 5 sacks of cement. This builds a cesspool 6 x 3 x 3 feet, and large enough for a family of five or six persons. The cover should be tight, a slab of stone or of cement with seven to nine inches of soil on top, and should not have any ventilating pipe, as the bacteria that work in it are the kind that work without air only. This tank is in effect a settling tank, and can be built of any size, shape or material so long as it is large enough to hold one day's sewage of the family, and so long as the sewage comes in so slowly that the solids have time to settle to the bottom of the tank, it will do all that is expected of it. The tank should be connected to the house by a four inch tile drain, every joint cemented and rubbed smooth on the inside. This should be 24 feet long and have

a tilt of one-half inch per foot. It enters half way up the side of the tank. The outlet is at the top of the tank and should be of four inch tile laid with open joints, so the clear water that passes out can pass into the soil at each point. This drain should be from 40 to 80 feet long, depending on soil, laid on a tilt of one thirty-second of an inch per foot. The slanting elbow, on the inside of the tank connected with the outlet, is to keep the scum that forms, in the tank, as in the scum a form of bacteria is working to purify the sewage. The only solid left in this tank is the mineral part, this amounts to very little in a year. It will not freeze so long as the house is occupied. There are two reasons for this: 1st, the character of the water entering the tank; and 2nd, because bacteria in working produce heat. The sewage should not stand in the tank. If the expected flow is cut down, dilute it with water. The water flowing from the outlet is a clear liquid, and is harmless.

A Member: Suppose the air got in the tank would it stop that process?

MRS. MONROE: If you put ventilation in the anarobic bacteria would not work. They are germs that work without air only and change the solids into this clear liquid which passes away through the outlet.

A Member: How many barrels of waste is that supposed to handle?

MRS. MONROE: A tank 6 feet long, 3 feet wide and 3 feet deep is large enough to take care of all the waste from a family of five or six persons. Where there are double that number of persons the tank should be made proportionately larger. It can be made large enough for a whole village to use but on the same plan. On the Scranton water shed there is a system of tanks like this in use. This tank works. It will not fill up. It will not freeze, although it is so near the surface of the ground, because the action of the bacteria gives off heat. You see this on the smoking manure pile on a cold morning. There the ammonia makes the heat.

A Member: What effect does wash day have on this tank?

MRS. MONROE: Not any at all. It takes care of the kitchen sink, the wash tub, the bath and all. It does away with all outside cesspools, outside closets and such things that are a menace to health.

A Member: We have a cesspool on the same principle and our out-take pipe runs for 20 rods and we have an odor there?

MRS. MONROE: Is it a closed pipe?

The Member: No; it runs through a tile pipe; open joints.

MRS. MONROE: Yes.

A Member: Is there any odor left at the end of that?

MRS. MONROE: There should not be.

A Member: We run this into an underdrain and this underdrain was two feet in the ground.

MRS. MONROE: I see; that is too far down and you do not get the action; has not the air.

A Member: I don't see why that should create a smell at the end if that water is pure.

MRS. MONROE: It should not. It must be in the arrangement of your pipes and a certain amount of the solids go out with the out-flow.

A Member: May I ask if there is any solid matter left in this tank?

MRS. MONROE: There is. The mineral matter is not acted upon by the bacteria and that amounts to less than one-half inch a year in a tank of this size.

The CHAIRMAN: We will now proceed with the third item on the program for this evening, "A Three Course Dinner," demonstrated with actual cooking, by Mrs. Anna B. Scott, Domestic Science Bureau, Philadelphia, Pa. I suppose you are anxiously awaiting dinner. I have the pleasure of introducing Mrs. Scott.

Mrs. Scott then proceeded with her talk and demonstration as follows:

A THREE COURSE DINNER.

By MRS. ANNA B. SCOTT, *Domestic Science Bureau, Philadelphia, Pa.*

Just a few words about the dinner we are going to cook at a cost of less than 60 cents, for four adults. I hope that every person here will come forward at the close of the demonstration and see the dinner. I only wish that there was enough for all, but I will leave it to a committee to taste, and say whether there is enough for four hungry people.

Yes, housekeeper, we are planning a dinner of well blended and well selected foods; for we want the meal, first, to be satisfying, nutritious and palatable. Second, we want to serve it in the best way to promote the health and pleasure of our family; no haphazard way for us. Just a few touches of refinement at the table mean so much to all. Yes, there are some who think only of filling up, and getting through with the meal; that will do. They are satisfied, and the

hunger is appeased. But housekeeper, let us make the dinner table the place that we meet at least once a day, and have a social time. Following is the menu for the dinner.

Sago Soup;

German Stew with Vegetables and Dumplings;

Creamed Spinach or Cabbage;

Peaches a la Conde.

Sago Soup.

6 cups stock;
 $\frac{1}{2}$ cup sago;
 1 tablespoon finely cut onion;
 1 tablespoon finely chopped parsley;
 1 teaspoon salt;
 Dash white pepper.

We can use rice, barley, or farino in the same way that we are using the sago. Our main thought in having the light soup is to prepare the stomach for the hearty dinner that is to follow.

Remove 6 cups of the stock from the meat that is stewing, add the onion and the sago that has been well washed; boil 30 minutes; then add the salt, pepper, and parsley.

Cost:—Sago, 2c; seasonings, 1c. Total, 3c.

German Stew with Vegetables and Dumplings.

1 $\frac{1}{2}$ pounds stewing beef;
 1 quart potatoes;
 1 cup cut carrot;
 1 $\frac{1}{2}$ cup cut onion;
 1 tablespoon salt;
 Dash white pepper;
 1 tablespoon caramel;
 1 tablespoon chopped parsley.

Wash or wipe the meat; put on to boil in 2 quarts boiling water; boil slowly 1 hour; remove 6 cups stock for soup; then add to the meat the potatoes, onion, carrot, salt and pepper. Boil 45 minutes or until all is tender, being sure that there is 2 cups stock; if there is not, add boiling water as it is needed. Add the dumplings; boil 10 minutes, without removing the lid. Place the dumplings around the edge of the platter; put the meat and vegetables in the center; add to the gravy the flour which has been mixed with a little cold water, and the caramel. Boil 2 minutes; pour over the meat and dumplings, and sprinkle the chopped parsley over the top.

Dumplings.

1 cup flour;
 1 teaspoon baking powder;
 1 $\frac{1}{2}$ teaspoon salt;
 1 teaspoon lard.

Sift the flour, salt and baking powder into a bowl; rub in the lard lightly with the tips of the fingers; add just enough cold water to hold the dough together. Take one teaspoonful at a time and roll in floured hands; lay on floured board until all are ready, then put in the meat.

Cost:—Meat, 21c; potatoes, 4c; dumplings, 3½c; seasonings, 1c. Total, 29½c.

Creamed Spinach, or Creamed Cabbage.

I had planned, this morning, to have creamed spinach, but as I went to several places and could not get real nice spinach we are going to have creamed cabbage. If I had been here yesterday I know that I should have been able to get nice spinach as Lancaster has good markets. But this same thing might happen to any housekeeper; after planning to have spinach, she finds that spinach is not to be had, so she gets the next best thing, that does not cost more than spinach. I looked around and all that I could see was a small head of cabbage. Of course you can substitute anything. There are nice string beans, news peas, and nice asparagus. But my thought is to bring you something that you can have 9 months in the year at small cost.

- 1 small head cabbage;
- 1 tablespoon butter;
- 1 tablespoon flour;
- 1 cup milk;
- 1 teaspoon salt;
- Dash white pepper;
- ½ teaspoon onion juice or ¼ teaspoon mace.

Cut the cabbage into small pieces; set aside in cold water 30 minutes; drain, put over fire with boiling water enough to cover. Boil 30 minutes without a cover, or until the cabbage is tender. That all depends on the age of the cabbage. Drain, add the sauce and boil 2 minutes.

Cream Sauce.

Put the butter into a sauce pan; when melted add the flour, then the cold milk slowly; stir until smooth and creamy; add the salt, pepper and onion juice or mace. Boil 2 minutes.

Cost:—Cabbage, 5c; butter, 3c; milk, 2c. Total, 10c.

Peaches a la Conde.

- 1 cup rice;
- ½ cup sugar;
- 2 cups peaches, cherries, strawberries, (either fresh or canned; fresh are best);
- ½ teaspoon salt;
- 1 teaspoon butter.

Wash the rice through several waters; put on with 4 quarts boiling water. Boil 25 minutes; strain; drain; blanch with boiling water; sprinkle with salt and spread on a platter or bake dish which has been brushed with melted butter; spread the fruit over the rice;

sprinkle the sugar over the fruit and place in hot oven 10 minutes. This is served with a sauce made as follows, or you can serve it with fruit juice, or with cream.

Sauce.

- 1 cup water;
- 1 cup peach juice;
- 2 tablespoons sugar;
- 1 tablespoon cornstarch;
- 1 tablespoon lemon juice.

As soon as the water comes to a boil add the cornstarch which has been mixed with a little cold water; boil 2 minutes then add the sugar, peach juice, and lemon juice.

Cost:—Rice, 4c; peaches, 10c; other ingredients, 1½c. Total, 15c. Total cost of dinner:

Soup, ...	\$.03
Meat, ...	.29½
Cabbage, ...	.10
Dessert, ...	.15½
	\$.58

The CHAIRMAN: This completes our program for the evening and this will be the closing session of the institute. If there are no further remarks or business this Institute will stand adjourned.

A. L. MARTIN,
Director of Institutes.



Commonwealth of Pennsylvania.

BULLETIN No. 214.

FARMERS'
Institutes in Pennsylvania

TO BE HELD UNDER THE
AUSPICES OF

The Pennsylvania Department of Agriculture

COMPILED BY

A. L. MARTIN, DIRECTOR OF INSTITUTES



SEASON 1911-1912

HARRISBURG:

U. B. AUGHINBAUGH, PRINTER TO THE STATE OF PENNSYLVANIA
1911

CALENDAR, 1911.

JANUARY.

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Commonwealth of Pennsylvania.

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A. L. MARTIN, DIRECTOR OF INSTITUTES



SEASON 1911-1912

HARRISBURG:

U. E. AUGHBAGH, PRINTER TO THE STATE OF PENNSYLVANIA
1911

Harvard College Library
May 27, 1912
Gift of
Pennsylvania State Library



Commonwealth of Pennsylvania.

BULLETIN No. 214

FARMERS' INSTITUTES IN PENNSYLVANIA

TO BE HELD UNDER THE AUSPICES OF THE
DEPARTMENT OF AGRICULTURE OF THE
STATE OF PENNSYLVANIA DURING
THE SEASON OF 1911-1912



ACT OF THE LEGISLATURE OF MARCH 13, 1895.

"Section 5. That it shall be the duty of the Superintendent of Institutes to arrange them in such manner as to time and places of holding the same as to secure the greatest economy and efficiency of service, and to this end he shall, in each county where such institutes are to be held, confer and advise with the local member of the State Board of Agriculture, together with representatives duly appointed by each county agricultural, horticultural and other like organizations with reference to the appointment of speakers and other local arrangements."

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LETTER OF TRANSMITTAL

DEPARTMENT OF AGRICULTURE

Harrisburg, Pa., Aug. 1, 1911.

Hon. N. B. Critchfield, *Secretary of Agriculture*:

Dear Sir: In accordance with the provisions of the Act creating the Department of Agriculture, I have the honor to present herewith the schedule of Farmers' Institutes of Pennsylvania for the season of 1911-1912; also a complete list of lecturers, with their subjects and their assignments.

Very respectfully,

A. L. MARTIN,
Director of Institutes.



COMMONWEALTH OF PENNSYLVANIA

DEPARTMENT OF AGRICULTURE

DIVISION OF INSTITUTES

Harrisburg, Pa., Aug. 1, 1911.

To the County Chairmen and Boards of Institute Managers in the
Several Counties of Pennsylvania:

Gentlemen: In presenting this annual Bulletin, we desire to express approval of the work accomplished by most of our County Institute Managers and the committees organized by them, to whom much credit is due for the high degree of success attending the last season's Institutes. We respectfully invite your careful attention to "Suggestions and Directions" on the following pages, which are prepared with reference to the requirements and demands of persons filling the position of County Chairman of Institutes.

A WORD TO INSTITUTE MANAGERS AND PROGRAM COMMITTEES

**PLEASE READ CAREFULLY THE FOLLOWING DIRECTIONS
BEFORE ARRANGING PROGRAMS FOR INSTITUTES**

1. We recommend that programs for all the Institutes held within a county be printed on connected leaves or sheets. This practice is recommended because of economy in cost of printing, also the wider advertising of the different institutes held within the county.

2. Prepare program at least thirty days before the date of Institute.

3. Arrangements should be made with persons in your locality who are to take part on the program either by essay, address or reading, at least eight weeks previous to the meeting.

4. Have a Question Box, and place it in charge of some competent person who will carefully conduct the same; retain said questions and forward them to the Director of Institutes.

5. Exclude from Institutes all sectarian and partisan topics.

6. Print on program the name and postoffice address of Chairman and members of Committees.

7. Thoroughly advertise the Institute by distributing programs, invitation postal cards, posters, and make use of your local newspapers.

8. Select a competent secretary to take notes and report proceedings of meeting to local papers.

9. Invite representatives of newspapers to a place at Recording Secretary's table, and solicit their aid and assistance in reporting proceedings of meeting.

10. For a two-day Institute, provide for five sessions, taking up not more than two topics at any one session, and where local speakers have places on program, the committee should be careful and see to it that their subjects shall conform to the topics under consideration at that particular session.

11. Locate Institutes where a suitable hall or church can be procured and the greatest number accommodated, as these meetings are for the benefit of farmers and their families and all others who may be interested.

12. Extend a personal invitation to your County Superintendent of Public Schools to be present and take part, especially at the educational session, without which no Institute is complete. Invite all farm organizations, school teachers and children. See to it that young men and boys have a special invitation to the Institute.

13. At least three State speakers will be in attendance, and a list of topics which they are prepared to discuss can be found in another part of this Bulletin. From this list the Committee on Program should select such topics as would most interest the farmers in their section, and place same opposite the lecturer's name on program.

14. The County Chairman should, as soon as arrangements are completed for holding Institute, enclose to all lecturers expected to be present, a copy of program, with letter designating what railroad station to stop at, and the name of the hotel secured for their accommodation. In case Institute is held at a distance from railroad, speakers must be met by conveyances and taken to Institute. The expense of getting from and to such stations is paid from funds placed in hands of County Chairman.

15. Remember, the Institute is for the whole county and not merely for the town or locality where held. Begin advertising and do not fail to let the public know of your meeting.

16. The State is divided into five sections. Beginning November 21, five Institutes will be in session at the same time. Three State speakers will be present at all Institutes, one of whom will be a special representative of the Department and have charge of the section, and may be regarded as an assistant to the presiding officer in the performance of his duties.

17. It is important that the Chairman of County Board of Institute Managers make a complete report of his Institutes, and mail same to the Director of Institutes as soon as possible after the close of the Institutes. Blanks for this purpose will be forwarded him. All essays of merit, read before Institutes, should be collected by the County Chairman, and forwarded to the Director of Institutes. A number of these essays are published annually in bulletin form, and we regret that space forbids that all can not be published. In selecting essays for publication we find many treating upon the same topic, all of which are meritorious, yet space would forbid the publication of more than one essay upon a given topic. These papers are placed on file for future reference.

18. Attention of Institute Managers and Program Committees is especially called to the plan of assigning speakers in the various sections. The leader of the section will be found at head of tabulated list of Places and Additional Lecturers, will be found at right of places where institutes will be held. Do not make the mistake as some Committees have done and overlook the leader of the section, but place his name on the program in like manner as other speakers are assigned.

19. The County Chairman should take personal charge of the meeting or select a person who is well qualified to fill the position.

20. The opening exercises should be brief, not consuming more than 30 minutes and may consist of an address of welcome and response or a brief address by the Chairman introducing the speakers who come from a distance.

21. Two topics thoroughly discussed at one session affords the opportunity for more effective instruction than three or four only partially presented.

22. At Educational Session, confine all discussions to that important subject, whether the speakers be State or local.

23. Where two evening sessions are held, have one devoted to Educational subjects and the other to the interests of the Country Home. Its Comforts, Sanitary Conditions and Adornments.

24. Music, properly conducted, is in place at the Institute, but should be introduced as a recreation and be voluntary as no fund is set apart for this purpose.

25. The amount of money to be distributed to the various managers for local expenses, will be according to the number of days of institutes held. In order to make the amount ample for the coming season, the sum has been fixed at \$12.50 per day of institute. This provides \$25.00 for each two days of institute, to be used for local expenses, such as printing programs, rent of halls, necessary expenses of local managers, etc.

DIRECTIONS FOR CONSTITUTING LOCAL COMMITTEES ON INSTITUTE WORK IN THE SEVERAL COUNTIES OF PENNSYLVANIA

The act of March 13, 1895 (Section 5), makes the following provisions: "That it shall be the duty of the Superintendent of Institutes to arrange them in such manner as to time and places of holding the same, as to secure the greatest economy and efficiency of service, and to this end he shall, in each county where such institutes are to be held, confer and advise with the local member of the State Board of Agriculture, together with the representatives duly appointed by each county agricultural, horticultural or other like organizations, with reference to the appointment of speakers and other local arrangements."

In order to carry this provision of the law into effect, the Director of Institutes directs that these representatives, one from each county organization as stated, duly chosen and properly accredited, together with the County Chairman of Institutes, shall constitute a Board of County Institute Managers, of which the County Chairman of Institutes shall be the Chairman of the said Board. The organizations entitled to representation, are members of the State Board of Agriculture, County Agricultural and Horticultural Societies, Pomona Granges and County Alliances.

The duty of this Board shall be to confer and advise with each other and the Director of Institutes, with reference to the appointment of speakers and other local arrangements for holding institutes.

It shall be the duty of each county organization named to notify the Director of Institutes of the appointment of its representatives, and at the same time give a similar notice to the County Chairman of Institutes.

The County Chairman of Institutes, together with these representatives of the county organizations, shall meet for organization on the second Tuesday in June in each year, at one o'clock P. M., in the county town, at the office of the county commissioners. At this meeting the place for holding institutes for the ensuing season shall be selected, the same to be subject to the approval of the Director of Institutes. An institute committee will also be appointed at this time, for each locality in which institutes are to be held.

The County Chairman of Institutes, and each duly accredited representative of the county organizations in attendance upon this meeting shall, upon the certificate of the Chairman of the Board of Managers, be paid his expenses, not to exceed two dollars.

In these meetings every member shall have equal voice, and the action of the majority shall decide. Notice of the action of the Board shall be sent by the Chairman to the Director of Institutes, within ten days after the meeting.

In case no representative from any county organization of that county shall appear at the meeting on the second Tuesday of June, as stated, then the County Chairman of Institutes shall immediately report the fact to the Director of Institutes and proceed to arrange for the holding of institutes that year, without further consultation with the local organizations.

All moneys allotted to any county, for use in institute work, will be paid to the chairman of the local committee, to be accounted for by him in an itemized statement, audited and signed by auditors appointed by the committee, and then forwarded to this Department, not later than the first day of May in each year.

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COMPLETE LIST OF

PENNSYLVANIA FARMERS' INSTITUTES,

SESSION OF 1911-1912.

**GIVING THE COUNTIES IN ALPHABETICAL ORDER, AND THE
NAME AND ADDRESS OF THE CHAIRMAN OF
EACH COUNTY; ALSO POSTOFFICE AND
RAILROAD STATION OF PLACE
WHERE INSTITUTES
ARE HELD.**



DIVISION OF INSTITUTES.

County.	Place.	Post Office.	Railroad Station.	Date.	Chairmen of Institutes.
Adams, ...	East Berlin, ...	East Berlin, ...	East Berlin, ...	12-13, ...	A. I. Weldner, Arendtsville.
	Fairfield, ...	Fairfield, ...	Fairfield, ...	14-15, ...	
	Arendtsville, ...	Arendtsville, ...	Big eriville, ...	Feb. 16-17, ...	
Allegheny, ...	Oakdale, ...	Oakdale, ...	Oakdale, ...	Jan. 29-30, ...	A. J. Purdy, Imperial, R. D.
	Pine Creek Church, ...	Etna, ...	Allison Park, ...	Jan. 31-Feb. 1, ...	
	Tarentum, ...	Tarentum, ...	Tarentum, ...	Feb. 2-3, ...	
Armstrong, ...	Spring Church, ...	Apollo, R. D., ...	Apollo, ...	Jan. 10-11, ...	S. S. Blyholder, Kelly Station.
	Kittanning, ...	Kittanning, ...	Kittanning, ...	Feb. 5-6, ...	
	Worthington, ...	Worthington, ...	Craigsville, ...	Feb. 7-8, ...	
Beaver, ...	New Bethlehem U. Church, ...	New Sheffield, ...	S. Heights, ...	Nov. 24-25, ...	A. L. McKibben, New Sheffield
	M. Pleasant U. P. Church, ...	New Sheffield, ...	Woodlawn, ...	Nov. 27-28, ...	
	Grange Hall, ...	Beaver, ...	Beaver, ...	Nov. 29-30, ...	
Bedford, ...	Charlestown, ...	Bedford R. D. No. 4, ...	Lutzville, ...	Jan. 1-2, ...	W. F. Biddle, Everett, R. D. No. 2.
	New Enterprise, ...	New Enterprise, ...	Hopewell, ...	Jan. 3-4, ...	
	Fishertown, ...	Fishertown, ...	Fishertown, ...	Jan. 5-6, ...	
Berks, ...	Shartlesville, ...	Shartlesville, ...	Hamburg, ...	Feb. 16-17, ...	H. G. McGowan, Geigers Mills.
	Georgetown, ...	Geiger's Mills, ...	Georgetown, ...	Feb. 18-20, ...	
	Topion, ...	Topion, ...	Topion, ...	Feb. 21-22, ...	
	Lehartsville, ...	Lehart, ...	Lehartsville, ...	Feb. 23-24, ...	
Blair, ...	Duncansville, ...	Duncansville, ...	Duncansville, ...	Jan. 19-20, ...	W. F. Beck, No. 1927 W. Chestnut Ave., Altoona.
	Williamsburg, ...	Williamsburg, ...	Williamsburg, ...	Jan. 29-30, ...	
	Tyrone, ...	Tyrone, ...	Tyrone, ...	Feb. 1-2, ...	
Bradford, ...	Campdown, ...	Campdown, ...	Wyalusing, ...	Jan. 1-2, ...	F. D. Kerrick, Towanda, R. D. No. 9.
	New Albany, ...	New Albany, ...	New Albany, ...	Jan. 3-4, ...	
	Ulatier, ...	Ulatier, ...	Ulatier, ...	Jan. 5-6, ...	
	Gillett, ...	Gillett, ...	Gillett, ...	Jan. 8-9, ...	
Bucks, ...	Newtown, ...	Newtown, ...	Newtown, ...	Feb. 5-6, ...	Watson T. Davis, Ivyland.
	Pineville, ...	Penna Park, ...	Wycombe, ...	Feb. 7-8, ...	
	Doylestown, ...	Doylestown, ...	Doylestown, ...	Feb. 9-10, ...	
	Springtown, ...	Springtown, ...	Springtown, ...	Feb. 12-13, ...	
	Sellersville, ...	Sellersville, ...	Sellersville, ...	Feb. 14-15, ...	

DIVISION OF INSTITUTES—Continued.

County.	Place.	Post Office.	Railroad Station.	Date.	Chairmen of Institutes.
Butler,.....	Saxonburg, Slippery Rock, Evans City, ...	Saxonburg, Slippery Rock, Evans City, ...	Cabot, Kelster, Evans City, ...	Feb. 9-10,..... Feb. 12-13,..... Feb. 14-15,.....	W. H. Milliron, Euclid.
Cambria, ...	Sallix, ...	Sallix, ...	Sallix, ...	Jan. 15-16,.....	James Westrick, Patton.
(Movable School.)	Nicktown, ...	Nicktown, ...	Spengler, ...	Jan. 17-18,.....	
Cameron, ...	Ebensburg, ...	Ebensburg, ...	Ebensburg, ...	Jan. 20-Feb. 1,...	
	Rich Valley, ...	Rich Valley, ...	Rich Valley, ...	Dec. 6,.....	W. H. Howard, Emporium.
	Truman, ...	Emporium, ...	Emporium, ...	Dec. 7,.....	
	Sterling Run, ...	Sterling Run, ...	Sterling Run, ...	Dec. 8,.....	
	Sinamahoning, ...	Sinamahoning, ...	Sinamahoning, ...	Dec. 9,.....	
Carbon, ...	Weatherly, ...	Weatherly, ...	Weatherly, ...	Jan. 19-20,.....	Edw. Lienhard, Mauch Chunk, R. D.
	Stemlerville, ...	Weisport, ...	Weisport, ...	Feb. 5-6,.....	
	New Mahoning, ...	Lehighton, ...	Lehighton, ...	Feb. 7-8,.....	
Center, ...	Eagleville, ...	Blanchard, ...	Eagleville, ...	Dec. 4-5,.....	John A. Woodward, Howard.
	Center Hall, ...	Center Hall, ...	Center Hall, ...	Dec. 6-7,.....	
	Stormstown, ...	Stormstown, ...	Port Matilda, ...	Dec. 8-9,.....	
Chester, ...	Oxford, ...	Oxford, ...	Oxford, ...	March 6-7,.....	M. E. Conrad, Westgrove.
	Avondale, ...	Avondale, ...	Avondale, ...	March 8-9,.....	
	Uniondale, ...	Uniondale, ...	Uniondale, ...	March 11-12,.....	
	Kimberton, ...	Kimberton, ...	Kimberton, ...	March 13-14,.....	
	Cedarville, ...	Pottstown, ...	Pottstown, ...	March 15-16,.....	
Clarion, ...	Foxburg, ...	Foxburg, ...	Foxburg, ...	Feb. 23-24,.....	J. H. Wilson, Clarion.
(Movable School.)	Limestone, ...	Limestone, ...	Limestone, ...	Feb. 26-27,.....	
	Clarion, ...	Clarion, ...	Clarion, ...	Jan 31-Feb. 3,....	
Clearfield, ...	Burnside, ...	Burnside, ...	Burnside, ...	Feb. 2-3,.....	Peter Gearhart, Clearfield.
	Curwensville, ...	Curwensville, ...	Curwensville, ...	Feb. 5-6,.....	
	Lathersburg, ...	Lathersburg, ...	Lathersburg, ...	Feb. 7-8,.....	
Clinton, ...	McElhattan, ...	McElhattan, ...	McElhattan, ...	Jan. 17-18,.....	Joel A. Herr, Millhall, R. D.
	Ligonion, ...	Ligonion, ...	Ligonion, ...	Jan. 19-20,.....	
	Mackeyville, ...	Mackeyville, ...	Mackeyville, ...	Jan. 29-30,.....	
Columbia (Movable Insti- tute School.)	Catawissa, ...	Catawissa, ...	Catawissa, ...	Jan. 8-11,.....	A. P. Young, Millville.
(Movable School.)	Orangeville, ...	Orangeville, ...	Orangeville, ...	Jan. 10-11,.....	

Crawford (Movable Institute School.)	Spartanburg, ...	Spartanburg, ...	Feb. 7-10, ...	J. S. Patton, Hartstown.
	Atlantic, ...	Atlantic, ...	March 4-5, ...	
	Dicksonburg, ...	Dicksonburg, ...	March 6-7, ...	
	Trepleville, ...	Cambridge Springs, ..	March 8-9, ...	
Cumberland, ...	Shepherdstown, ...	Shepherdstown, ...	Nov. 27-28, ...	T. J. Ferguson, Mechanicsburg.
	Hogestown, ...	Hogestown, ...	Nov. 29, ...	
	New Kingston, ...	New Kingston, ...	Dec. 1-2, ...	
	Newburg, ...	Newburg, ...	Dec. 4-5, ...	
Dauphin, ...	Hummelstown, ...	Hummelstown, ...	Jan. 15-16, ...	E. S. Kelper, Middletown.
	Linglestown, ...	Linglestown, ...	Jan. 17-18, ...	
	Gratz, ...	Gratz, ...	Jan. 19-20, ...	
	Middletown, ...	Middletown, ...	Jan. 22-23, ...	
Delaware, ...	Media, ...	Media, ...	Feb. 28-29, ...	E. J. Durnall, Swarthmore.
	Newtown Square, ...	Newtown Square, ...	March 1-2, ...	
	Concordville, ...	Concordville, ...	March 4-5, ...	
Elk, ...	St. Marys, ...	St. Marys, ...	Nov. 24-25, ...	John G. Schmidt, St. Marys.
	Rasclaa, ...	Rasclaa, ...	Nov. 27-28, ...	
Erie (Movable Institute School.)	Edinboro, ...	Edinboro, ...	Feb. 9-13, ...	Archie Billings, Edinboro.
	Waterford, ...	Waterford, ...	Feb. 28-29, ...	
	East Springfield, ..	East Springfield, ..	March 1-2, ...	
Fulton, ...	Clear Ridge, ...	Clear Ridge, ...	Dec. 19-20, ...	J. L. Patterson, McConnellsburg.
	Locust Grove, ...	Locust Grove, ...	Dec. 22-23, ...	
Fayette, ...	Dunbar, ...	Dunbar, ...	Dec. 18-19, ...	T. H. Smith, Dunbar, E. D. No. 20.
	Farmington, ...	Farmington, ...	Dec. 20-21, ...	
	Morris Cross Roads, ..	Morris Cross Roads, ..	Dec. 22-23, ...	
Forest, ...	Kelletrville, ...	Kelletrville, ...	Feb. 19-20, ...	C. A. Randall, Tionesta.
	Tionesta, ...	Tionesta, ...	Feb. 21-22, ...	
Franklin, ...	Dry Run, ...	Dry Run, ...	Dec. 6-7, ...	J. P. Young, Marion.
	St. Thomas, ...	St. Thomas, ...	Dec. 8-9, ...	
	Marion, ...	Marion, ...	Dec. 11-12, ...	
Greene, ...	Fordyce, ...	Fordyce, ...	Nov. 20-21, ...	J. W. Stewart, Jefferson.
	Taylorstown, ...	Taylorstown, ...	Nov. 23-25, ...	
Huntingdon, ...	Orbisonia, ...	Orbisonia, ...	March 11-12, ...	G. G. Hutchison, Warriors Mark.
	Alexandria, ...	Alexandria, ...	March 13-14, ...	
	Warriors Mark, ...	Warriors Mark, ...	March 15-16, ...	
Indiana, ...	Sidney, ...	Sidney, ...	Jan. 1-2, ...	S. O. George, West Lebanon.
	Corode, ...	Corode, ...	Jan. 3-4, ...	
	Chambersville, ...	Chambersville, ...	Jan. 5-6, ...	
	Elders Ridge, ...	Elders Ridge, ...	Jan. 8-9, ...	

DIVISION OF INSTITUTES—Continued.

County.	Place.	Post Office.	Railroad Station.	Date.	Chairmen of Institutes.
Jefferson, ...	Beechwood Church, Pres. Clover Grange Hall, ...	Allens Mills, ...	Beechton, ...	Nov. 20-21, ...	Peter B. Cowan, Brookville, R. D. 4.
Junata, ...	Port Royal, ...	Baxter, ...	Baxter, ...	Nov. 22-23, ...	Matthew Rodgers, Mexico.
Lackawanna, ...	Daleville, ...	Port Royal, ...	Port Royal, ...	March 6-7, ...	
	Richfield, ...	Richfield, ...	Mifflin, ...	March 8-9, ...	
	Daleville, ...	Gouldsboro, R. D., ..	Mooscow, ...	Nov. 20-21, ...	Horace Seamans, Factoryville.
	Daleville, ...	Gouldsboro, R. D., ..	Mooscow, ...	Nov. 22-23, ...	
	Clark Green, ...	Clark Green, ...	Clark Summit, ..	Nov. 24-25, ...	
	Tompkinsville, ...	Jermyn, R. D., ...	Jermyn, ...	Nov. 27-28, ...	
(Movable Institute School.)	Bald Mount, ...	Clark Summit, ...	Clark Summit, ..	Jan. 12-16, ...	
Lancaster, ...	Quarryville, ...	Quarryville, ...	Quarryville, ...	Dec. 18-19, ...	J. Aldus Herr, Lancaster, R. D. No. 4.
	Lampeter, ...	Lampeter, ...	Lampeter, ...	Dec. 20-21, ...	Edw. Hilshman, Ephrata.
	Paradise, ...	Paradise, ...	Edelman Place, ..	Dec. 22-23, ...	
	Fredericksburg, ...	Marbleton, ...	Fredericksburg, ..	Jan. 1-2, ...	
	Tititz, ...	Tititz, ...	Tititz, ...	Jan. 3-4, ...	
	Ephrata, ...	Ephrata, ...	Ephrata, ...	Jan. 5-6, ...	
	Maytown, ...	Maytown, ...	Marletta, ...	Jan. 8-9, ...	
Lawrence (Movable Institute School.)	New Wilmington, ..	New Wilmington, ..	New Wilmington, ..	Feb. 12-15, ...	Sylvester Shaffer, New Castle, R. D.
	Ellwood City, ...	Ellwood City, ...	Ellwood City, ...	Feb. 16-17, ...	
	Pulaski, ...	Pulaski, ...	Pulaski, ...	Feb. 19-20, ...	
	Volant, ...	Volant, ...	Volant, ...	Feb. 21-22, ...	
Lebanon (Movable Institute School.)	Annville, ...	Annville, ...	Annville, ...	Jan. 1-4, ...	Edw. Shuey, Lickdale.
	Jonestown, ...	Jonestown, ...	Jonestown, ...	Jan. 10-11, ...	
	Schaefferstown, ...	Schaefferstown, ...	Richland, ...	Jan. 12-13, ...	
Lehigh (Movable Institute School.)	Allentown, ...	Allentown, ...	Allentown, ...	Jan. 3-6, ...	P. S. Fenstermaker, Allentown.
	Pleasant Corner, ...	Jordan Valley, ...	Germansville, ...	Feb. 26-27, ...	
	Alburtis, ...	Alburtis, ...	Alburtis, ...	Feb. 28-29, ...	
Luzerne, ...	Dallas, ...	Dallas, ...	Dallas, ...	Jan. 12-13, ...	J. M. Hildebrandt, Dallas, R. D. No. 2.
	Sweet Valley, ...	Sweet Valley, ...	Stockshinn, ...	Jan. 15-16, ...	
	Hibble, ...	Wapwallopen, ...	Wapwallopen, ...	Jan. 17-18, ...	

DIVISION OF INSTITUTES—Continued.

County.	Place.	Post Office.	Railroad Station.	Date.	Chairmen of Institutes.
Snyder,	Freeburg.	Freeburg.	Middleburg.	26-27.	J. S. Kaufman, Middleburg.
	Beavertown.	Beavertown.	Beavertown.	28-29.	
	Berlin.	Berlin.	Berlin.	8-9.	
Somerset,	Somerset.	Somerset.	Somerset.	10-11.	J. C. Weller, Rockwood, R. D. No. 2.
	Davidaville.	Davidaville.	Holsapple.	12-13.	
Sullivan,	Colley.	Colley.	Dushore.	15-16.	E. R. Warburton, Campbellville.
	Dushore.	Dushore.	Dushore.	18-19.	
Susquehanna,	Clifford.	Clifford.	Carbondale.	20-20.	
	Gelatti.	Gelatti.	Ararat.	1-2.	F. A. Davies, Montrose.
	Hallstead.	Hallstead.	Hallstead.	4-5.	
	Montrose.	Montrose.	Montrose.	6.	
Tioga,	Liberty.	Liberty.	Roaring Branch.	Jan. 31-Feb. 1.	C. H. DeWitt, Mansfield.
	Mansfield.	Mansfield.	Mansfield.	Feb. 2-3.	
	Mitchells Mills.	Millerton.	Millerton.	Feb. 5.	
	Lawrenceville.	Lawrenceville.	Lawrenceville.	Feb. 6.	
	Wellaboro.	Wellaboro.	Wellaboro.	Feb. 7-8.	
	Westfield.	Westfield.	Westfield.	Feb. 9-10.	
Union,	New Berlin.	New Berlin.	Winfield.	9-10.	J. Newton Glover, Vicksburg.
	New Columbia.	New Columbia.	New Columbia.	12-13.	
Venango,	Coopers town.	Coopers town.	Franklin.	Feb. 11-12.	W. A. Crawford, Coopers town.
	Emonton.	Emonton.	Emonton.	Feb. 13-14.	
Warren (Movable Institute Schools.)	Tidionte.	Tidionte.	Tidionte.	Feb. 2-6.	Geo. A. Woodside, Sugargrove.
	Grand Valley.	Grand Valley.	Grand Valley.	Feb. 5-8.	
Washington,	Centerville.	West Brownsville.	West Brownsville.	Dec. 1-2.	D. S. Taylor, Burgettstown, R. D. No. 3.
	Ruffalo Village.	Washington, E. D.	Washington.	Dec. 4-5.	
	Midway.	Midway.	Midway.	Dec. 6-7.	
Wayne,	Honesdale.	Honesdale.	Honesdale.	16.	W. M. Ferham, Pleasant Mt.
	Galilee.	Galilee.	Conecton.	18-19.	
	Calkins.	Calkins.	Honesdale.	Dec. 20-21.	
	Beech Lake.	Beech Lake.	Honesdale.	Dec. 22-23.	

(Movable Institute School.) Westmoreland, ...	Hamilla, ...	Hamilla, ...	Ariel, ...	Jan. 15-18, ...	M. P. Shoemaker, Greensburg.
	Apollo, ...	Apollo, ...	Apollo, ...	Jan. 12-13, ...	
	Smithton, ...	Smithton, ...	Smithton, ...	Jan. 15-16, ...	
	Pleasant Unity, ...	Pleasant Unity, ...	Pleasant Unity, ...	Jan. 17-18, ...	
	Ligonier, ...	Ligonier, ...	Ligonier, ...	Jan. 19-20, ...	
Wyoming, ...	Mill City, ...	Mill City, ...	Falls, ...	Dec. 20-21, ...	D. A. Knappenberg, Lake Carey.
	Tunkhannock, ...	Tunkhannock, ...	Tunkhannock, ...	Dec. 22-23, ...	
York, ...	Cross Roads, ...	Felton R.D. No. 1, ...	Felton, ...	Jan. 29-30, ...	Geo. F. Barnes, Reservoir.
	Red Lion, ...	Red Lion, ...	Red Lion, ...	Jan. 31-Feb. 1, ...	
	Hellam, ...	Hellam, ...	Hellam, ...	Feb. 2-3, ...	
	Dover, ...	Dover, ...	Dover, ...	Feb. 5-6, ...	
	Manchester, ...	Manchester, ...	Manchester, ...	Feb. 7-8, ...	
	New Freedom, ...	New Freedom, ...	New Freedom, ...	Feb. 9-10, ...	

PENNSYLVANIA FARMERS' INSTITUTES

ASSIGNMENTS OF LECTURERS BY SECTIONS FOR 1911-1912

FIRST SECTION

PROF. FRANKLIN MENGES will attend all meetings in this section.

Date.	Place.	County.	Additional Lecturers.
Nov.	27-28, Shepherdstown, ..	Cumberland, ...	Sheldon W. Funk, C. M. Barnitz and Prof. Wells W. Cooke.
Nov.	29, Hogestown, ...	Cumberland, ...	Sheldon W. Funk, C. M. Barnitz and Prof. Wells W. Cooke.
Dec.	1-2, New Kingston, ..	Cumberland, ...	Sheldon W. Funk, C. M. Barnitz and Prof. Wells W. Cooke.
Dec.	4-5, Newburg, ...	Cumberland, ...	Sheldon W. Funk, C. M. Barnitz, Prof. Wells W. Cooke and Prof. Chas. F. Shaw.
Dec.	6-7, Dry Run, ...	Franklin, ...	Sheldon W. Funk, C. M. Barnitz, Prof. Wells W. Cooke and Prof. Chas. F. Shaw.
Dec.	8-9, St. Thomas, ...	Franklin, ...	Sheldon W. Funk, C. M. Barnitz, Prof. Wells W. Cooke and Prof. Chas. F. Shaw.
Dec.	11-12, Marion, ...	Franklin, ...	Sheldon W. Funk, C. M. Barnitz and Prof. Wells W. Cooke.
Dec.	18-19, Quarryville, ...	Lancaster, ...	Prof. T. I. Mairs, Dr. Wm. Frear and Leon Otice Van Noy.
Dec.	20-21, Lampeter, ...	Lancaster, ...	Prof. T. I. Mairs, Dr. Wm. Frear and Leon Otice Van Noy.
Dec.	22-23, Paradise, ...	Lancaster, ...	Prof. T. I. Mairs, Dr. Wm. Frear and Leon Otice Van Noy.
Jan.	1-2, Mechanicsville, ..	Lancaster, ...	R. V. Mitchell, Dr. Wm. Frear and Leon Otice Van Noy.
Dec.	3-4, Lititz, ...	Lancaster, ...	R. V. Mitchell, Dr. Wm. Frear and Leon Otice Van Noy.
Jan.	5-6, Ephrata, ...	Lancaster, ...	R. V. Mitchell, Dr. Wm. Frear and Leon Otice Van Noy.
Jan.	8-9, Maytown, ...	Lancaster, ...	R. V. Mitchell, Miss Arabella Carter and Leon Otice Van Noy.
Jan.	10-11, Jonestown, ...	Lebanon, ...	R. V. Mitchell, M. S. Bond and Leon Otice Van Noy.
Jan.	12-13, Schaefferstown, .	Lebanon, ...	R. V. Mitchell, M. S. Bond and Leon Otice Van Noy.

Date.	Place.	County.	Additional Lecturers.
Jan.	15-16, Hummelstown, ..	Dauphin, ...	M. H. McCallum, Sheldon W. Funk, Frank Kline and Leon Otice Van Noy.
Jan.	17-18, Linglestown, ...	Dauphin, ...	M. H. McCallum, Sheldon W. Funk, Frank Kline and Leon Otice Van Noy.
Jan.	19-20, Gratz, ...	Dauphin, ...	M. H. McCallum, Sheldon W. Funk and Leon Otice Van Noy.
Jan.	22-23, Middletown, ...	Dauphin, ...	M. H. McCallum, Sheldon W. Funk, Leon Otice Van Noy and E. K. Hibshman.
Jan.	29-30, Cross Roads, ...	York, ...	D. E. Murray, Chas. T. Cornman and A. J. Kahler.
Jan 31, Feb.	1, Red Lion, ...	York, ...	D. E. Murray, Chas. T. Cornman and A. J. Kahler.
Feb.	2-3, Hellam, ...	York, ...	D. E. Murray, Chas. T. Cornman and A. J. Kahler.
Feb.	5-6, Dover, ...	York, ...	D. E. Murray, L. W. Arny and T. J. Phillips.
Feb.	7-8, Manchester, ...	York, ...	D. E. Murray, L. W. Arny and T. J. Phillips.
Feb.	9-10, New Freedom, ..	York, ...	D. E. Murray, L. W. Arny and T. J. Phillips.
Feb.	12-13, East Berlin, ...	Adams, ...	D. E. Murray, L. W. Arny and Miss Sara Phillips Thomas.
Feb.	14-15, Fairfield, ...	Adams, ...	D. E. Murray, L. W. Arny and Miss Sara Phillips Thomas.
Feb.	16-17, Arendtsville, ...	Adams, ...	D. E. Murray, L. W. Arny and Miss Sara Phillips Thomas.
Feb.	19-20, Ellittsburg, ...	Perry, ...	Joel A. Herr, L. W. Arny and Sheldon W. Funk.
Feb.	21-22, Newport, ...	Perry, ...	Joel A. Herr, L. W. Arny and Sheldon W. Funk.
Feb.	23-24, Roseglan, ...	Perry, ...	Joel A. Herr, L. W. Arny and Sheldon W. Funk.
Feb.	26-27, Bustleton, ...	Philadelphia, ...	M. H. McCallum and Frank Kline.
Feb.	28-29, Media, ...	Delaware, ...	D. H. Watts, M. H. McCallum and Miss Mary A. Burnite.
March	1-3, Newton Square..	Delaware, ...	D. H. Watts, M. H. McCallum and Miss Mary A. Burnite.
March	4-5, Concordville, ...	Delaware, ...	D. H. Watts, M. H. McCallum and Miss Mary A. Burnite.
March	6-7, Oxford, ...	Chester, ...	D. H. Watts, M. H. McCallum and Miss Mary A. Burnite.
March	8-9, Avondale, ...	Chester, ...	D. H. Watts, M. H. McCallum and Miss Mary A. Burnite.
March	11-12, Uniondale, ...	Chester, ...	D. H. Watts, M. H. McCallum, M. S. McDowell and Miss Mary A. Burnite.
March	13-14, Kimberton, ...	Chester, ...	D. H. Watts, M. H. McCallum, M. S. McDowell and Miss Mary A. Burnite.
March	15-16, Cedarville, ...	Chester, ...	D. H. Watts, M. H. McCallum, M. S. McDowell and Miss Mary A. Burnite.

SECOND SECTION.

J. H. PEACHEY will attend all meetings in this section.

Date.	Place.	County.	Additional Lecturers.
Dec.	4-5, Eagleville, ...	Centre, ...	E. B. Dorsett, Fred W. Card and M. N. Clark.
Dec.	6-7, Centre Hall, ...	Centre, ...	E. B. Dorsett, Fred W. Card and M. N. Clark.
Dec.	8-9, Stormstown, ...	Centre, ...	E. B. Dorsett, Fred W. Card and M. N. Clark.
Dec.	19-20, Clear Ridge, ...	Fulton, ...	E. B. Dorsett, Dr. W. T. Phillipy and W. H. Stout.
Dec.	22-23, Locust Grove, ...	Fulton, ...	E. B. Dorsett, Dr. W. T. Phillipy and W. H. Stout.
Jan.	1-2, Charlesville, ...	Bedford, ...	F. H. Fassett, C. C. McCurdy and Geo. E. Hull.
Jan.	3-4, New Enterprise, .	Bedford, ...	F. H. Fassett, C. C. McCurdy and Geo. E. Hull.
Jan.	5-6, Fishertown, ...	Bedford, ...	F. H. Fassett, C. C. McCurdy and Geo. E. Hull.
Jan.	8-9, Berlin, ...	Somerset, ...	F. H. Fassett, C. C. McCurdy and Fred W. Card.
Jan.	10-11, Somerset, ...	Somerset, ...	F. H. Fassett, C. C. McCurdy and Fred W. Card.
Jan.	12-13, Davidsville, ...	Somerset, ...	F. H. Fassett, C. C. McCurdy and Fred W. Card.
Jan.	15-16, Salix, ...	Cambria, ...	F. H. Fassett, Chas. T. Cornman and Fred W. Card.
Jan.	17-18, Nicktown, ...	Cambria, ...	F. H. Fassett, Chas. T. Cornman and Fred W. Card.
Jan.	19-20, Duncansville, ...	Blair, ...	F. H. Fassett, Chas. T. Cornman and Fred W. Card.
Jan.	29-30, Williamsburg, ...	Blair, ...	F. H. Fassett, Prof. T. I. Mairs and Mrs. Jean Kane Foulke.
Jan. 31, Feb. 1,	Tyrone, ...	Blair, ...	F. H. Fassett, Prof. T. I. Mairs and Mrs. Jean Kane Foulke.
Feb.	2-3, Burnside, ...	Clearfield, ...	C. M. Barnitz, Prof. T. I. Mairs and Mrs. Jean Kane Foulke.
Feb.	5-6, Curwensville, ...	Clearfield, ...	C. M. Barnitz, Dr. W. T. Phillipy and F. E. Bonsteel.
Feb.	7-8, Luthersburg, ...	Clearfield, ...	C. M. Barnitz, Dr. W. T. Phillipy and F. E. Bonsteel.
Feb.	9-10, New Berlin, ...	Union, ...	C. M. Barnitz, Dr. W. T. Phillipy and F. E. Bonsteel.
Feb.	12-13, New Columbia, ..	Union, ...	C. M. Barnitz, Dr. W. T. Phillipy and F. E. Bonsteel.
Feb.	14-15, Watontown, ...	Northumberland, ..	C. M. Barnitz, Dr. W. T. Phillipy and F. E. Bonsteel.
Feb.	16-17, Snyderstown, ...	Northumberland, ..	W. Theo. Wittman, Dr. W. T. Phillipy and F. E. Bonsteel.
Feb.	19-20, Urban, ...	Northumberland, ..	W. Theo. Wittman, Dr. W. T. Phillipy and Miss Arabella Carter.
Feb.	21-22, Washingtonville, ..	Montour, ...	W. Theo. Wittman, Dr. W. T. Phillipy and Miss Arabella Carter.

Date.	Place.	County.	Additional Lecturers.
Feb.	23-24, Mausdale, ...	Montour, ...	W. Theo. Wittman, Dr. W. T. Phillipy and Miss Arabella Carter.
Feb.	26-27, Freeburg, ...	Snyder, ...	W. Theo. Wittman, Dr. W. T. Phillipy and W. H. Stout.
Feb.	28-29, Beavertown, ...	Snyder, ...	W. Theo. Wittman, Dr. W. T. Phillipy and W. H. Stout.
March	1-2, Milroy, ...	Mifflin, ...	W. Theo. Wittman, Dr. W. T. Phillipy, W. H. Stout and Dr. J. H. Funk.
March	4-5, McVeytown, ...	Mifflin, ...	W. Theo. Wittman, Dr. W. T. Phillipy and Dr. J. H. Funk.
March	6-7, Port Royal, ...	Juniata, ...	W. Theo. Wittman, Dr. W. T. Phillipy and Dr. J. H. Funk.
March	8-9, Richfield, ...	Juniata, ...	W. Theo. Wittman, Sheldon W. Funk and Mrs. Sara B. F. Zeigler.
March	11-12, Orbisonia, ...	Huntingdon, ...	W. A. Cook, Sheldon W. Funk and Mrs. Sara B. F. Zeigler.
March	13-14, Alexandria, ...	Huntingdon, ...	W. A. Cook, Sheldon W. Funk and Mrs. Sara B. F. Zeigler.
March	15-16, Warriors Mark, .	Huntingdon, ...	W. A. Cook, Sheldon W. Funk and Mrs. Sara B. F. Zeigler.

THIRD SECTION.

L. W. LIGHTY will attend all meetings in this section.

Nov.	20-21, Fordyce, ...	Greene, ...	D. H. Watts and Prof. Homer W. Jackson.
Nov.	22-23, Taylortown, ...	Greene, ...	D. H. Watts and Prof. Homer W. Jackson.
Nov.	24-25, New Bethlehem, Beaver, ...	U. P. Church.	D. H. Watts and Prof. Homer W. Jackson.
Nov.	27-28, Mt. Pleasant, ...	Beaver, ...	D. H. Watts and Prof. W. Theo. Wittman and Prof. W. A. Cochel.
Nov.	29-30, Grange Hall, ...	Beaver, ...	D. H. Watts, W. Theo. Wittman.
Dec.	1-2, Centerville, ...	Washington, ...	D. H. Watts, W. Theo. Wittman and Mrs. Sarah B. F. Zeigler.
Dec.	4-5, Buffalo Village, ..	Washington, ...	D. H. Watts, W. Theo. Wittman and Mrs. Sarah B. F. Zeigler.
Dec.	6-7, Midway, ...	Washington, ...	D. H. Watts, W. Theo. Wittman and Mrs. Sarah B. F. Zeigler.
Dec.	18-19, Dunbar, ...	Fayette, ...	D. H. Watts, Prof. H. R. Fulton and Hugh P. Baker.
Dec.	20-21, Farmington, ...	Fayette, ...	D. H. Watts, Prof. H. R. Fulton and Hugh P. Baker.
Dec.	22-23, Morris Cross Roads.	Fayette, ...	D. H. Watts, Prof. H. R. Fulton and Hugh P. Baker.
Jan,	1-2, Sidney, , , , , , ,	Indiana, ...	D. H. Watts, R. S. Seeds and H. M. Gooderham.

Date.	Place.	County.	Additional Lecturers.
Jan.	3-4, Covode, ...	Indiana, ...	D. H. Watts, R. S. Seeds and H. M. Gooderham.
Jan.	5-6, Chambersville, ..	Indiana, ...	D. H. Watts, R. S. Seeds and H. M. Gooderham.
Jan.	8-9, Elders Ridge, ...	Indiana, ...	D. H. Watts, R. S. Seeds and H. M. Gooderham.
Jan.	10-11, Spring Church, ..	Armstrong, ...	D. H. Watts, R. S. Seeds and H. M. Gooderham.
Jan.	12-13, Apollo, ...	Westmoreland, ..	D. H. Watts, R. S. Seeds and H. M. Gooderham.
Jan.	15-16, Smithton, ...	Westmoreland, ..	D. H. Watts, R. S. Seeds and H. M. Gooderham.
Jan.	17-18, Pleasant Unity, ..	Westmoreland, ..	D. H. Watts, R. S. Seeds and H. M. Gooderham.
Jan.	19-20, Ligonier, ...	Westmoreland, ..	D. H. Watts, R. S. Seeds and H. M. Gooderham.
Jan.	29-30, Oakdale, ...	Allegheny, ...	R. S. Seeds, C. E. Myers and C. H. Rich.
Jan. 31, Feb. 1,	Pine Creek Church,	Allegheny, ...	R. S. Seeds, C. E. Myers and C. H. Rich.
Feb.	2-3, Tarentum, ...	Allegheny, ...	R. S. Seeds, C. E. Myers and C. H. Rich.
Feb.	5-6, Kittanning, ...	Armstrong, ...	Fred. W. Card, Chas. F. Noll and I. A. Esch- bach.
Feb.	7-8, Worthington, ...	Armstrong, ...	Fred. W. Card, Chas. F. Noll and I. A. Esch- bach.
Feb.	9-10, Saxonburg, ...	Butler, ...	Fred. W. Card, Chas. F. Noll and I. A. Esch- bach.
Feb.	12-13, Slippery Rock, ..	Butler, ...	Fred. W. Card, W. M. Pat- ton and Mrs. Jean Kane Foulke.
Feb.	14-15, Evans City, ...	Butler, ...	Fred. W. Card, W. M. Pat- ton and Mrs. Jean Kane Foulke.
Feb.	16-17, Ellwood City, ...	Lawrence, ...	Fred. W. Card, W. M. Patton, C. C. McCurdy and Mrs. Jean Kane Foulke.
Feb.	19-20, Pulaski, ...	Lawrence, ...	Fred. W. Card, W. M. Patton, C. C. McCurdy and Mrs. Jean Kane Foulke.
Feb.	21-22, Volant, ...	Lawrence, ...	Fred. W. Card, C. C. Mc- Curdy and Mrs. Jean Kane Foulke.
Feb.	23-24, Sharpsville, ...	Mercer, ...	Fred. W. Card, C. C. Mc- Curdy and Mrs. Jean Kane Foulke.
Feb.	26-27, Fredonia, ...	Mercer, ...	Fred. W. Card, C. C. Mc- Curdy and J. B. John- ston.
Feb.	28-29, Jackson Centre, ..	Mercer, ...	Fred. W. Card, C. C. Mc- Curdy and J. B. John- ston.
March	1-2, Sheakleyville, ...	Mercer, ...	Fred. W. Card, C. C. Mc- Curdy and J. B. John- ston.
March	4-5, Atlantic, ...	Crawford, ...	Fred. W. Card, E. L. Phil- lips and W. M. C. Drake.
March	6-7, Dicksonburg, ...	Crawford, ...	Fred. W. Card, E. L. Phil- lips and W. M. C. Drake.
March	8-9, Teepleville, ...	Crawford, ...	Fred. W. Card, E. L. Phil- lips and W. M. C. Drake.
March	11-12, Cooperstown, ...	Venango, ...	Fred. W. Card, E. L. Phil- lips and B. O. Severson.
March	13-14, Emlenton, ...	Venango, ...	Fred. W. Card, E. L. Phil- lips and B. O. Severson.

FOURTH SECTION.

J. T. CAMPBELL will attend all meetings in this section.

Date.	Place.	County.	Additional Lecturers.
Nov.	20-21, Beechwood Church, ...	Pres. Jefferson, ...	Prof. Frank D. Gardner, Leon Otice Van Noy and A. J. Kahler.
Nov.	22-23, Clover Hall, ...	Grange Jefferson, ...	Prof. Frank D. Gardner, Leon Otice Van Noy and A. J. Kahler.
Nov.	24-25, St. Marys, ...	Elk, ...	Prof. Frank D. Gardner, Leon Otice Van Noy and A. J. Kahler.
Nov.	27-28, Rasselas, ...	Elk, ...	F. E. Bonsteel and Leon Otice Van Noy.
Nov.	29-30, Crosby, ...	McKean, ...	F. E. Bonsteel and Leon Otice Van Noy.
Dec.	1-2, Eldred, ...	McKean, ...	F. E. Bonsteel and Leon Otice Van Noy.
Dec.	4, Farmers Valley, ...	McKean, ...	F. E. Bonsteel, Leon Otice Van Noy and H. W. Northup.
Dec.	5, Wrights, ...	McKean, ...	F. E. Bonsteel, Leon Otice Van Noy and H. W. Northup.
Dec.	6, Rich Valley, ...	Cameron, ...	F. E. Bonsteel, Leon Otice Van Noy and H. W. Northup.
Dec.	7, Truman, ...	Cameron, ...	F. E. Bonsteel, Leon Otice Van Noy and H. W. Northup.
Dec.	8, Sterling Run, ..	Cameron, ...	F. E. Bonsteel, Leon Otice Van Noy and H. W. Northup.
Dec.	9, Sinnamahoning, ..	Cameron, ...	F. E. Bonsteel, Leon Otice Van Noy and H. W. Northup.
Dec.	15-16, Colley, ...	Sullivan, ...	Prof. Wm. G. Owens, C. E. Myers and Joel A. Herr.
Dec.	18-19, Dushore, ...	Sullivan, ...	Prof. Wm. G. Owens, C. E. Myers and Joel A. Herr.
Dec.	20-21, Mill City, ...	Wyoming, ...	Prof. Wm. G. Owens, C. E. Myers and Joel A. Herr.
Dec.	22-23, Tunkhannock, ..	Wyoming, ...	Prof. Wm. G. Owens, C. E. Myers and Joel A. Herr.
Jan.	1-2, Camptown, ...	Bradford, ...	E. B. Dorsett, E. K. Hibshman and W. H. McIntire.
Jan.	3-4, New Albany, ...	Bradford, ...	E. B. Dorsett, E. K. Hibshman and W. H. McIntire.
Jan.	5-6, Ulster, ...	Bradford, ...	E. B. Dorsett, E. K. Hibshman, W. H. McIntire and Mrs. Jean Kane Foulke.
Jan.	8-9, Gillett, ...	Bradford, ...	E. B. Dorsett, E. K. Hibshman, W. H. McIntire and Mrs. Jean Kane Foulke.
Jan.	10-11, Halls, ...	Lycoming, ...	C. L. Goodling, Dr. W. T. Phillipy and Mrs. Jean Kane Foulke.
Jan.	12-13, Warrensville, ...	Lycoming, ...	C. L. Goodling, Dr. W. T. Phillipy and Mrs. Jean Kane Foulke.
Jan.	15-16, Limestone Church,	Lycoming, ...	C. L. Goodling, Dr. W. T. Phillipy and E. K. Hibshman.
Jan.	17-18, McElhattan, ...	Clinton, ...	C. L. Goodling, Dr. W. T. Phillipy, Mrs. Geo. E. Monroe and E. K. Hibshman.

Date.	Place.	County.	Additional Lecturers.
Jan.	19-20, Loganton, ...	Clinton,	C. L. Coodling, Dr. W. T. Phillips, Mrs. Geo. E. Monroe and E. K. Hibshman.
Jan.	29-30, Mackeyville, ...	Clinton,	Dr. J. D. Detrich, E. L. Phillips and Miss Sara Phillips Thomas.
Jan. 31, Feb. 1,	Liberty, ...	Tioga,	Dr. J. D. Detrich, E. L. Phillips and Miss Sara Phillips Thomas.
Feb.	2-3, Mansfield, ...	Tioga,	Dr. J. D. Detrich, E. L. Phillips and F. H. Fassett.
Feb.	5, Mitchells Mills,...	Tioga,	Dr. J. D. Detrich, F. H. Fassett and W. M. C. Drake.
Feb.	6, Lawrenceville, ..	Tioga,	Dr. J. D. Detrich, F. H. Fassett and W. M. C. Drake.
Feb.	7-8, Wellsboro, ...	Tioga,	Dr. J. D. Detrich, F. H. Fassett and W. M. C. Drake.
Feb.	9-10, Westfield, ...	Tioga,	Dr. J. D. Detrich, F. H. Fassett and W. M. C. Drake.
Feb.	12-13, West Branch, ...	Potter,	Dr. J. D. Detrich, F. H. Fassett and W. M. C. Drake.
Feb.	14-15, North Bingham, Potter, ...	Potter,	Dr. J. D. Detrich, F. H. Fassett and W. M. C. Drake.
Feb.	16-17, Roulette, ...	Potter,	Dr. J. D. Detrich, F. H. Fassett and W. M. C. Drake.
Feb.	19-20, Kelletville, ...	Forest,	Dr. J. D. Detrich, F. H. Fassett and M. N. Clark.
Feb.	21-22, Tionesta, ...	Forest,	Dr. J. D. Detrich, F. H. Fassett, H. W. Northup and M. N. Clark.
Feb.	23-24, Foxburg, ...	Clarion,	Dr. J. D. Detrich, F. H. Fassett and H. W. Northup.
Feb.	26-27, Limestone, ...	Clarion,	Dr. J. D. Detrich, F. H. Fassett and H. W. Northup.
Feb.	28-29, Waterford, ...	Erie,	Dr. J. D. Detrich, F. H. Fassett and H. W. Northup.
March	1-2, East Springfield, Erie, ...	Erie,	Dr. J. D. Detrich, F. H. Fassett and H. W. Northup.

FIFTH SECTION—PART 1.

R. P. KESTER will attend all meetings in this section.

Nov.	20-21, Daleville, ...	Lackawanna, ...	W. Theo. Wittman, E. B. Dorsett and Dr. J. H. Funk.
Nov.	22-23, Madisonville, ...	Lackawanna, ...	W. Theo. Wittman, E. B. Dorsett and Dr. J. H. Funk.
Nov.	24-25, Clarks Green, ..	Lackawanna, ...	W. Theo. Wittman, E. B. Dorsett and Dr. J. H. Funk.
Nov.	27-28, Tompkinsville, ..	Lackawanna, ...	Dr. M. E. Conard, E. B. Dorsett and Dr. J. H. Funk.
Nov.	29-30, Clifford, ...	Susquehanna, ...	Dr. M. E. Conard, E. B. Dorsett and Dr. J. H. Funk.
Dec.	1-2, Gelatt, ...	Susquehanna, ...	Dr. M. E. Conard, E. B. Dorsett and Dr. J. H. Funk.
Dec.	4-5, Hallstead, ...	Susquehanna, ...	Dr. M. E. Conard and Dr. J. H. Funk.

Date.	Place.	County.	Additional Lecturers.
Dec.	6, Montrose, ...	Susquehanna, ...	Dr. M. E. Conard and Dr. J. H. Funk.
Dec.	16, Honesdale, ...	Wayne, ...	Dr. M. E. Conard, H. M. Anderson and Dr. J. H. Funk.
Dec.	18-19, Galilee, ...	Wayne, ...	Dr. M. E. Conard, H. M. Anderson and Dr. J. H. Funk.
Dec.	20-21, Calkins, ...	Wayne, ...	Dr. M. E. Conard, H. M. Anderson and Dr. J. H. Funk.
Dec.	22-23, Beech Lake, ...	Wayne, ...	Dr. M. E. Conard, H. M. Anderson and Dr. J. H. Funk.
Jan.	1-2, Paupack, ...	Pike, ...	D. E. Murray, H. M. Anderson and D. B. Baker.
Jan.	3-4, Greentown, ...	Pike, ...	D. E. Murray, H. M. Anderson and D. B. Baker.
Jan.	5-6, Stroudsburg, ...	Monroe, ...	D. E. Murray, H. M. Anderson and D. B. Baker.
Jan.	8-9, Tannersville, ...	Monroe, ...	D. E. Murray, Mrs. Geo. E. Monroe and S. Paul Woodman.
Jan.	10-11, Gilbert, ...	Monroe, ...	D. E. Murray and S. Paul Woodman.
Jan.	12-13, Dallas, ...	Luzerne, ...	D. E. Murray and S. Paul Woodman.
Jan.	15-16, Sweet Valley, ...	Luzerne, ...	D. E. Murray and S. Paul Woodman.
Jan.	17-18, Hobbie, ...	Luzerne, ...	D. E. Murray and S. Paul Woodman.
Jan.	19-20, Weatherly, ...	Carbon, ...	D. E. Murray and S. Paul Woodman.
Jan.	29-30, Hellertown, ...	Northampton, ...	M. H. McCallum, Leon Otice Van Noy and W. G. Ross.
Jan. 31, Feb. 1, Mt. Bethel, ...	Northampton, ...	M. H. McCallum, Leon Otice Van Noy and W. G. Ross.	
Feb.	2-3, Cherryville, ...	Northampton, ...	M. H. McCallum, Leon Otice Van Noy and W. G. Ross.
Feb.	5-6, Stemplerville, ...	Carbon, ...	M. H. McCallum, Leon Otice Van Noy and Sheldon W. Funk.
Feb.	7-8, New Mahoning, ..	Carbon, ...	M. H. McCallum, Leon Otice Van Noy and Sheldon W. Funk.
Feb.	9-10, Barnesville, ...	Schuylkill, ...	M. H. McCallum, Leon Otice Van Noy and Sheldon W. Funk.
Feb.	12-13, Pitman, ...	Schuylkill, ...	M. H. McCallum, Leon Otice Van Noy and M. S. Bond.
Feb.	14-15, Hegins, ...	Schuylkill, ...	M. H. McCallum, Leon Otice Van Noy and M. S. Bond.
Feb.	16-17, Shartlesville, ...	Berks, ...	M. H. McCallum, Leon Otice Van Noy and M. S. Bond.
Feb.	19-20, Gelgertown, ...	Berks, ...	M. H. McCallum, Leon Otice Van Noy and Dr. M. E. Conard.
Feb.	21-22, Topton, ...	Berks, ...	M. H. McCallum, Leon Otice Van Noy and Dr. M. E. Conard.
Feb.	23-24, Lenhartsville, ...	Berks, ...	M. H. McCallum, Leon Otice Van Noy and Dr. M. E. Conard.
Feb.	26-27, Pleasant Corner, Lehigh, ...	Chas. M. Barnitz, Leon Otice Van Noy and Dr. M. E. Conard.	
Feb.	28-29, Alburtis, ...	Lehigh, ...	Chas. M. Barnitz, Leon Otice Van Noy and Dr. M. E. Conard.

FIFTH SECTION—PART 2.

Messrs. D. H. WATTS, CHAS. T. CORNMAN and PROF. WELLS W. COOKE will attend all meetings in this section.

Date.	Place.	County.	Additional Lecturers.
Feb.	5-6, Newtown, ...	Bucks, ...	
Feb.	7-8, Pineville, ...	Bucks, ...	
Feb.	9-10, Doylestown, ...	Bucks, ...	
Feb.	12-13, Springtown, ...	Bucks, ...	
Feb.	14-15, Sellersville, ...	Bucks, ...	
Feb.	16-17, Trappe, ...	Montgomery, ...	T. J. Phillips.
Feb.	19-20, Center Point, ...	Montgomery, ...	T. J. Phillips.
Feb.	21-22, King of Prussia, ...	Montgomery, ...	T. J. Phillips.
Feb.	23-24, Salfordville, ...	Montgomery, ...	T. J. Phillips.
Feb.	26-27, East Greenville, ..	Montgomery, ...	T. J. Phillips.

MOVABLE INSTITUTE SCHOOLS.

DIRECTIONS TO COUNTY CHAIRMEN AND COMMITTEES OF ARRANGEMENTS.

The following outline of Dairy, Horticultural and Poultry Topics form the basis of such instruction as will be taken up at the Movable Institute Schools. At a four-day meeting two days will be devoted to Dairy Instruction and two days divided between Horticulture and Poultry Interests. In preparing program, please select such topics as will be best suited for your locality, arranging for the speakers on such days as they are scheduled in Institute Bulletin. We recommend that at least one session relating to the Dairy Barn, Its Ventilation, etc., be held in a suitable Dairy Barn, also that one Horticultural Session be held in a nearby Orchard, if the weather will permit. A lady speaker will be in attendance at one or more days at each school to give instruction on Household Economics, Home Sanitation and Domestic Science and should be placed on program for evening session.

SCHOOL OF HORTICULTURE.
Session I.

Subject: *How a tree grows.*

Root system:

Structure of root

Functions

Absorption of food

Conduction

Effect of root pruning

Root injury.

Trunk and branches:

Structure of stem

What is cambium

Function of stem

Buds

Relative to pruning.

Foliage:

Structure of leaf

Development

Assimilation

Evaporation of water

Effect of loss or injury of foliage.

The flower and fruit:

Structure

Pollination

Quality

Color.

Practicum—An hour will be devoted to the examination of prepared sections of roots, stems and leaves with the use of the compound microscope.

Session II.**Subject—*Horticultural Literature.***

Value of Books, Reports and Bulletins.

How to obtain publications.

Free publications.

Issued by U. S. Dept. of Agr.

Issued by State Dept. of Agr.

Issued by Experimental Stations.

Issued by Nursery Firms.

Other publications:

Technical reports of U. S. Dept. of Agr., that must be purchased.

Periodicals.

Valuable books on Horticulture.

How to use literature.

How to use the Experiment Station.

Value of writing for publication.

Value of conventions.

Practicum—Review and discussion of assigned literature by members on selected subjects.

Session III.**Subject—*How to feed a tree.***

Methods of tillage:

The timothy crop

Mulches—sod mulch

—Hitching's method

Pasturing orchards

Cultivation
Intercropping
Cover crops.

Fertilizers:

Barnyard manure
Wood ashes
Lime
Commercial fertilizers.

Practicum—Pruning in a local orchard.

Session IV.

Subject—*Varieties of fruits.*

Origin of varieties
Improvement by selection
Improvement by cross breeding
Top working varieties
Adaptation of varieties
Importance of local varieties
Change of latitude
Self sterility of fruits
Mixing varieties in orchards
How to choose varieties
Types of apples.

Practicum—To be announced.

Session V.

BUSINESS PROBLEMS OF THE ORCHARD.

Subject—*Harvesting and Marketing Fruit.*

When to pick and how
Picking devices
Effect of sun on picked fruit
Effect of rain on picked fruit
Effect of frost on picked fruit
Packing and packages
Packing houses and conveniences
Storing and storing houses
Shipping—associations
Demands of the market
Value of business methods
Value of cooperation.

Practicum—To be announced.

Session VI.

Subject—*Insect enemies.*

Codling moth
Apple tree borer

Scale insects
 Canker worm
 Peach tree borer
 Curculios
 Rose Chafer.

Each insect will be considered in regard to the following points:

Life history of the insect
 Injury to plants
 How to identify
 Remedies and treatment.

Practicum—Collection and study of insect pests by the members of the school in local orchards and gardens.

Session VII.

Subject—*Fungous diseases.*

Apple scale
 Apple leaf spot
 Apple rust
 Apple twig blight
 Apple canker
 Crown gall
 Peach Yellows
 Leaf curl
 Brown rot
 Pear tree blight
 Pear leaf blight.

Each disease will be considered in regard to the following points:

The outward symptoms
 The casual fungus or bacterium
 The plants and parts affected
 Remedies.

Practicum—A search in local orchards will be made by members for any diseased material for study and identification.

SCHOOL OF DAIRYING.

Subject—*The Dairy Barn.*

Plan and arrangement.
 Its convenience.
 Tools and implements, where kept and what are needed.
 The cow stall.
 Material of stall.
 The dimensions.
 The floor drop.
 Manure gutter; how made.

Practicum—An hour will be devoted to the examination of the Dairy Barn.

Subject—*Light.*

Windows, where located.
 How constructed.
 Effect upon the animal.

Subject—*Ventilation.*

A suitable intake system.
 The outlet for air.
 Convenient arrangement of doors and chutes.
 Ceiling construction.

Subject—*How to feed.*

Extravagant feeding.
 Long hay, fodder and ground grain.
 Exposure to sun, storms and rains.

Subject—*Profitable feeding.*

Short cut hay, fodder and ensilage.
 Ground grain and products of mills.
 Balance the feed to suit the cow.
 How to balance a ration.
 How to count profit and loss in feeding.
 Best hay, fodder and silage.
 How often should cows be fed.

Subject—*Care and management of the cow.*

How to keep a cow warm in winter.
 How to water and salt a cow.
 How to curry, bed and clean a cow.

Subject—*The dairy cow.*

Her breeding; the sire and dam.
 Conformation.
 The proper formed udder and teats.

Subject—*Raising the calf.*

What does it cost to raise a calf to be a cow.
 How fed.
 When fed.
 What shall constitute the feed.

Practice in testing milk products.	Lecture on cream ripening with cream to be set.
Testing of samples to show variations daily, time of milking, first and last milk, daily, speed, temperature, flushing.	Churning and packing for market accompanied by explanation.
Butter judging, acid test, fermentations.	
Test three-day comp. samples from different herds. Cows to be in pairs same time in milk.	

EXERCISE I.

BABCOCK TEST: The quality of milk and cream depends largely on the butter-fat in it.

To learn the amount of fat find the weight of milk and the per cent. of fat.

The Babcock Test merely tells what per cent. of the material is fat.

THE PRINCIPLE: The breaking up of the milk, or cream, etc., by sulphuric acid setting the fat free; separating it from the other constituents by means of centrifugal force, this being done in a bottle graduated to show the per cent. of fat.

VITAL: Features are a fair sample, an accurate measure of the amount used, complete separation, and accurate reading of the results, at proper temperature.

THE MILK: To be tested, fair sample, thoroughly mixed, pouring if practicable, sample measured with a pipette, 17.6 c. c. See that end is not broken. Milk should be ordinary room temperature.

THE ACID: Commercial sulphuric, strength, 1:82 sp. gr.; amount, 17.5 c. c.

Strong acid chars the fat—use less of it.

Weak acid shows white sediment in fat column, use more of it.

Slant bottle so ingoing acid runs down side of bottle. Mix with the milk at once.

Whirl five minutes, add hot water up to neck, whirl one minute, add water to 8 mark, whirl one minute, read. If using hand tester and room is cool, place bottle in bath at 120 for two or three minutes before reading.

Read from top of upper meniscus to bottom of lower.

Empty while warm, rinse, wash with alkali water, rinse.

CREAM: To test it the amount required should be weighed into the sample bottle, because the variation in its richness, the amount that will adhere to the pipette and the gas and air mixed in it by hauling or standing, make it impossible to measure the required amount accurately. The amount, 18 grains, or half this amount, in the latter case, with the ordinary cream bottle the reading would have to be doubled.

The amount of acid used with cream should be reduced a little, and after it is mixed with the cream should be allowed to stand a few minutes.

SKIM MILK: Tested the same as whole milk, except that a little more acid is required. The speed of the tester should be increased. A double neck skim milk bottle is required, especially for separator skim milk.

EXERCISE II.

The per cent. of fat in milk varies with different cows, with different breeds, with the same cow from day to day, from one milking to another, with change of feed, change of weather, fright, abuse, noise that is unusual, if not accustomed to them, the presence of strangers at milking time may cause variation. The per cent. of fat in the milk is usually lower soon after the cow is fresh, than it is later in the period of lactation; with many cows the per cent. of increase slightly as the cow gets older. It is usually highest for the shortest period between milkings, and when these are equal for the one during which there has been most activity. The per cent. of fat is more influenced by nervous condition of the animal and individuality than by feed.

In separator cream, the per cent. of fat varies, because of variation of the per cent. of fat in the milk separated, temperature of milk at separating time, fullness of the supply can, speed of the separator, the amount of skim milk, or water, used in flushing the bowl.

In separator skim milk the increased per cent. of fat may be due, slow speed of separator, cold milk, irregular speed, machine not standing steady and firm.

EXERCISE III.

Scoring butter according to a score card, is but expressing in mathematical terms, the quality of butter. As yet no way has been devised for measuring the quality of butter, except to depend on the judgment of those skilled in the work. The score card:

Flavor,	45
Body,	25
Color,	15
Salt,	10
Style,	5
Total,	100

FLAVOR: Should be mild rich creamy, with a delicate mild pleasant aroma.

Some of the common faults of flavor; flat, lacking in the flavor due to proper development of the lactic acid, rancid due to over ripe cream, old cream, unclean, showing the effect of unclean milking, unclean utensils, surroundings, or methods. Weedy, presence of flavors probably caused by undesirable feeds. Feverish, from milk from cows not in good health or too soon after freshening, or during sexual excitement. Smothered, due to closing the can of milk before properly cooling, or exposing closed can of milk to hot sun enroute to creamery. Fruity, or vegetable flavors, caused by presence of decaying vegetables or fruit. Dish rag, due to wiping utensils with the dish cloth, instead of thoroughly scalding with boiling water and allowing to dry.

BODY: Should be firm and waxy, not brittle, greasy, tallowy, spongy, sticky, or salvy.

COLOR: Should be uniform and even, free from streaks, mottles, curds.

SALT: Should be of desired amount, thoroughly dissolved, free from grit and evenly distributed.

STYLE: Package should be neat, clean, and tight.

EXERCISE IV.

This exercise to be devoted to testing samples of milk brought in by members of the class, and taken so as to show the difference in the variations in the composition of milk. To emphasize the value of knowing what each cow is producing in return for the feed she is consuming, to show how an approximate record may be kept with little real work.

Material required for keeping such records.

A spring balance, good one costs \$4.00 though a much cheaper one will answer fairly well.

Sample jars, one for each cow, may be common fruit jars or milk jars, but should have covers.

A Babcock Tester that need not cost over \$5.00.

The discovery of and removal from the herd of one or two cows that are eating more dollars worth of grain, hay and pasture than they are producing milk and butter fat to pay for will many times over pay for the labor and expense involved, especially when it is recalled that some cows produce \$75.00 and \$80.00 worth of butter fat for \$35.00 or \$40.00 worth of feed.

A milk sheet, with may be ruled up on common brown paper as follows:

DATE.	Name of Cow.	Name of Cow.	Name of Cow.	Name of Cow.

SCHOOL OF POULTRY HUSBANDRY.

Subject—*Breeds.*

Short history of the various breeds. Origin, types and future advantages of pure bred flocks.

Principals of breeding, particularly along the line of increased egg production.

Effects of selection, cross-breeding, line breeding and inbreeding.

Subject—*Foods and Feeding.*

Purposes of feeding.

Comparative value of the various grains.

How best to feed and when.

Feeding for eggs, for growth, for fattening, etc.

Green food, animal food, shell and bone food, charcoal condiments.

Subject—*Houses and Yards.*

Colony, continuous house and free range plans.

Situations, soils and exposures.

Advantages of low cost, construction and simplicity.

Wide open and curtain front, fresh air houses.

Subject—*Easy and Simple Methods of Poultry Keeping.*

Why such methods are best.

Where most people fall down.

Advantages of poultry keeping; vast importance and extent of same.

Subject—*Incubation.*

The advantages and disadvantages of natural and artificial incubation compared.

Necessary adjuncts of good hatches.

Subject—*Brooding and Rearing.*

Natural methods of brooding.

Cold brooders; artificially heated brooders.

The first feed for chicks.

Extreme importance and desirability of uninterrupted or unchecked growth.

Subject—*Winter Egg Production.*

Factors making the same.

Selecting and handling the layers.

Housing and feeding.

Marketing the eggs.

Note—Besides the list of the various Poultry Journals and the bulletins on Poultry Keeping issued by the National and various State Departments of Agriculture, those interested in Poultry Keeping should secure and study Poultry Craft, by Robinson; Progressive Poultry Culture, by Bingham; The New Book on Poultry, by Wright; Poultry Culture, by Felch; and A Living from Poultry, by Boyer.

MOVABLE INSTITUTE SCHOOLS

SEASON 1911-1912

Date.	Place.	County.	Lecturers.
Jan.	1-2, Annville, ...	Lebanon, ...	Dr. J. H. Funk and W. Theo. Wittman.
Jan.	3, Annville, ...	Lebanon, ...	Dr. M. E. Conard, R. J. Weld and Mrs. Geo. E. Monroe.
Jan.	4, Annville, ...	Lebanon, ...	Dr. M. E. Conard and R. J. Weld.
Jan.	3, Allentown, ...	Lehigh, ...	Dr. J. H. Funk and W. Theo. Wittman.
Jan.	4, Allentown, ...	Lehigh, ...	Dr. J. H. Funk, W. Theo. Wittman and Mrs. Geo. E. Monroe.
Jan.	5-6, Allentown, ...	Lehigh, ...	Dr. M. E. Conard and R. J. Weld.
Jan.	5-6, Orwigsburg, ...	Schuylkill, ...	Dr. J. H. Funk, W. Theo. Wittman and Mrs. Geo. E. Monroe.
Jan.	8-9, Orwigsburg, ...	Schuylkill, ...	Dr. M. E. Conard and R. J. Weld.
Jan.	8-9, Catawissa, ...	Columbia, ...	Dr. J. H. Funk and W. Theo. Wittman.
Jan.	10, Catawissa, ...	Columbia, ...	Dr. M. E. Conard and R. J. Weld and Mrs. Geo. E. Monroe.
Jan.	11, Catawissa, ...	Columbia, ...	Dr. M. E. Conard and R. J. Weld.
Jan.	10, Orangeville, ...	Columbia, ...	Dr. J. H. Funk and W. Theo. Wittman.
Jan.	11, Orangeville, ...	Columbia, ...	Dr. J. H. Funk, W. Theo. Wittman and Mrs. Geo. E. Monroe.
Jan.	12-13, Orangeville, ...	Columbia, ...	Dr. M. E. Conard and R. J. Weld.
Jan.	12-13, Bald Mount, ...	Lackawanna, ...	Dr. J. H. Funk, W. Theo. Wittman and Mrs. Geo. E. Monroe.

Date.	Place.	County.	Lecturers.
Jan.	15-16, Bald Mount, ...	Lackawanna, ...	Dr. M. E. Conard and R. J. Weld.
Jan.	15, Hamlin, ...	Wayne, ...	Dr. J. H. Funk, W. Theo. Wittman and Mrs. Geo. E. Monroe.
Jan.	16, Hamlin, ...	Wayne, ...	Dr. J. H. Funk and W. Theo. Wittman.
Jan.	17-18, Hamlin, ...	Wayne, ...	Dr. M. E. Conard and R. J. Weld.
Jan.	29-30, Ebensburg, ...	Cambria, ...	Dr. J. H. Funk and W. Theo. Wittman.
Jan.	31, Ebensburg, ...	Cambria, ...	Dr. M. E. Conard and R. J. Weld.
Feb.	1, Ebensburg, ...	Cambria, ...	Dr. M. E. Conard, R. J. Weld and Miss Mary A. Burnite.
Jan 31, Feb. 1,	Clarion, ...	Clarion, ...	Dr. J. H. Funk and W. Theo. Wittman.
Feb.	2, Clarion, ...	Clarion, ...	Dr. M. E. Conard, R. J. Weld and Miss Mary A. Burnite.
Feb.	3, Clarion, ...	Clarion, ...	Dr. M. E. Conard and R. J. Weld.
Feb.	2, Tidioute, ...	Warren, ...	Dr. J. H. Funk and W. Theo. Wittman.
Feb.	3, Tidioute, ...	Warren, ...	Dr. J. H. Funk, W. Theo. Wittman and Miss Mary A. Burnite.
Feb.	5, Tidioute, ...	Warren, ...	Dr. M. E. Conard, R. J. Weld and Miss Mary A. Burnite.
Feb.	3, Tidioute, ...	Warren, ...	Dr. M. E. Conard and R. J. Weld.
Feb.	5, Grand Valley, ...	Warren, ...	Dr. J. H. Funk and W. Theo. Wittman.
Feb.	6, Grand Valley, . .	Warren, ...	Dr. J. H. Funk, W. Theo. Wittman and Miss Mary A. Burnite.
Feb.	7-8, Grand Valley, ...	Warren, ...	Dr. M. E. Conard and R. J. Weld.
Feb.	7-8, Spartansburg, ...	Crawford, ...	Dr. J. H. Funk, W. Theo. Wittman and Miss Mary A. Burnite.
Feb.	9-10, Spartansburg, ...	Crawford, ...	Dr. M. E. Conard and R. J. Weld.
Feb.	9-10, Edinboro, ...	Erie, ...	Dr. J. H. Funk, W. Theo. Wittman and Miss Mary A. Burnite.
Feb.	12-13, Edinboro, ...	Erie, ...	Dr. M. E. Conard and R. J. Weld.
Feb.	12-13, New Wilmington, Lawrence, ...	Lawrence, ...	Dr. J. H. Funk, W. Theo. Wittman and Miss Mary A. Burnite.
Feb.	14-15, New Wilmington, Lawrence, ...	Lawrence, ...	Dr. M. E. Conard and R. J. Weld.

LIST OF SPEAKERS AND THEIR ASSIGNMENTS

FOR THE SEASON OF 1911-1912

H. M. ANDERSON, New Park, York County, Pa.

Date.	Place	County.
Dec. 16,.....	Honesdale,.....	Wayne.
Dec. 18-19,.....	Galilee, ...	Wayne.
Dec. 20-21,.....	Calkins, ...	Wayne.
Dec. 22-23,.....	Beech Lake, ...	Wayne.
Jan. 1-2,.....	Paupack, ...	Pike.
Jan. 3-4,.....	Greentown, ...	Pike.
Jan. 5-6,.....	Stroudsburg, ...	Monroe.

L. W. ARNY, New Britain, Bucks County, Pa.

Feb. 5-6,.....	Dover, ...	York.
Feb. 7-8,.....	Manchester, ...	York.
Feb. 9-10,.....	New Freedom, ...	York.
Feb. 12-13,.....	East Berlin, ...	Adams.
Feb. 14-15,.....	Fairfield, ...	Adams.
Feb. 16-17,.....	Arendtsville, ...	Adams.
Feb. 19-20,.....	Elliottsburg, ...	Perry.
Feb. 21-22,.....	Newport, ...	Perry.
Feb. 23-24,.....	Roseglen, ...	Perry.

D. B. BAKER, Dillsburg, York County, Pa.

Jan. 1-2,.....	Paupack, ...	Pike.
Jan. 3-4,.....	Greentown, ...	Pike.
Jan. 5-6,.....	Stroudsburg, ...	Monroe.

PROF. HUGH G. BAKER, State College, Center County, Pa.

Dec. 18-19,.....	Dunbar, ...	Fayette.
Dec. 20-21,.....	Farmington, ...	Fayette.
Dec. 22-23,.....	Morris Cross Roads, ..	Fayette.

CHAS. M. BARNITZ, RIVERSIDE, Northumberland County, Pa.

Will attend all meetings in the First Section from November 27 to December 12; Second Section from February 2 to February 15 and the Fifth Section February 26 to February 29.

M. S. BOND, Danville, Montour County, Pa.

Date.	Place	County.
Jan. 10-11,.....	Jonestown, ...	Lebanon.
Jan. 12-13,.....	Schaefferstown, ...	Lebanon.
Feb. 12-13,.....	Pitman, ...	Schuylkill.
Feb. 14-15,.....	Hegins, ...	Schuylkill.
Feb. 16-17,.....	Shartlesville, ...	Berks.

F. E. BONSTEEL, Bear Lake, Warren County, Pa.

Will attend all meetings in the Fourth Section from November 27 to December 9 and the Second Section from February 5 to February 17.

MISS MARY A. BURNITE, No. 132 Broad Street, Newark, N. J.

Will attend Movable Institute Schools from February 1 to February 12, and Farmers' Institutes in the First Section from February 28 to March 16.

J. T. CAMPBELL, Hartstown, Crawford County, Pa.

Will attend all meetings in the Fourth Section.

FRED W. CARD, Sylvania, Bradford County, Pa.

Will attend all meetings in the Second Section from December 4 to December 9, and from January 8 to January 20, and in the Third Section from February 5 to March 14.

MISS ARABELLA CARTER, No. 1305 Arch Street, Philadelphia, Pa.

Jan. 8-9,.....	Maytown, ...	Lancaster.
Feb. 19-20,.....	Urban, ...	Montour.
Feb. 21-22,.....	Washingtonville, ...	Northumberland.
Feb. 23-24,.....	Mausdale, ...	Montour.

M. N. CLARK, Claridge, Westmoreland County, Pa.

Dec. 4-5,.....	Eagleville, ...	Centre.
Dec. 6-7,.....	Centre Hall, ...	Centre.
Dec. 8-9,.....	Stormtown, ...	Centre.
Feb. 19-20,.....	Kelletville, ...	Forest.
Feb. 21-22,.....	Tionesta, ...	Forest.

PROF. W. A. COCHEL, State College, Center County, Pa.

Date.	Place	County.
Nov. 27-28,.....	Mt. Pleasant U. P. Ch.,	Beaver.

DR. M. E. CONARD, Westgrove, Chester County, Pa.

Will attend all meetings in the Fifth Section from November 27 to December 23, and from February 19 to February 29, and Movable Institute Schools from January 3 to February 15.

WALTER A. COOK, State Collegé, Pa.

March 11-12,.....	Orbisonia, ...	Huntingdon.
March 13-14,.....	Alexandria, ...	Huntingdon.
March 15-16,.....	Warriors Mark, ...	Huntingdon.

PROF. WELLS W. COOKE, Department of Agriculture, Washington, D. C.

Will attend all meetings in the First Section from November 27 to December 12, and all meetings in the Fifth Section, Part 2 from February 5 to February 27.

CHAS. T. CORNMAN, Carlisle, Cumberland County, Pa.

Will attend all meetings in the Second Section from January 15 to January 20; First Section, January 29 to February 3, and the Fifth Section Part 2, from February 5 to February 27.

DR. J. D. DETRICH, No. 438 Adams Avenue, Scranton, Pa.

Will attend all meetings in the Fourth Section from January 29 to March 2.

E. B. DORSETT, Mansfield, Tioga County, Pa.

Will attend all meetings in the Fifth Section from November 20 to December 2; Second Section from December 4 to December 23 and the Fourth Section from January 1 to January 9.

W. M. C. DRAKE, Volant, Lawrence County, Pa.

Feb. 5,.....	Mitchells Mills, ...	Tioga.
Feb. 6,.....	Lawrenceville, ...	Tioga.
Feb. 7-8,.....	Wellsboro, ...	Tioga.
Feb. 9-10,.....	Westfield, ...	Tioga.
Feb. 12-13,.....	West Branch, ...	Tioga.
Feb. 14-15,.....	North Bingham, ...	Potter.
Feb. 16-17,.....	Roulette, ...	Potter.
March 4-5,.....	Atlantic, ...	Crawford.
March 6-7,.....	Dicksonburg, ...	Crawford.
March 8-9,.....	Teepleville, ...	Crawford.

I. A. ESCHBACH, Milton, R. F. D. No. 1, Northumberland County, Pa.

Date.	Place	County.
Feb. 7-8,.....	Worthington, ...	Armstrong.
Feb. 9-10,.....	Saxonburg, ...	Butler.
Feb. 12-13,.....	Slippery Rock, ...	Butler.

F. H. FASSETT, Meshoppen, Wyoming County, Pa.

Will attend all meetings in the Second Section from January 1 to February 1, and in the Fourth Section from February 2 to March 2.

MISS JEAN KANE FOULKE, West Chester, Chester County, Pa.

Jan. 5-6,.....	Ulster, ...	Bradford.
Jan. 8-9,.....	Gillett, ...	Bradford.
Jan. 10-11,.....	Halls, ...	Lycoming.
Jan. 12-13,.....	Warrensville, ...	Lycoming.
Jan. 29-30,.....	Williamsburg, ...	Blair.
Jan. 31, Feb. 1,.....	Tyrone, ...	Blair.
Feb. 2-3,.....	Burnside, ...	Clearfield.
Feb. 12-13,.....	Slippery Rock, ...	Butler.
Feb. 14-15,.....	Evans City, ...	Butler.
Feb. 16-17,.....	Ellwood City, ...	Lawrence.
Feb. 19-20,.....	Pulaski, ...	Lawrence.
Feb. 21-22,.....	Volant, ...	Lawrence.
Feb. 23-24,.....	Sharpsville, ...	Mercer.

PROF. H. R. FULTON, State College, Center County, Pa.

Dec. 18-19,.....	Dunbar, ...	Fayette.
Dec. 20-21,.....	Farmington, ...	Fayette.
Dec. 22-23,.....	Morris Cross Roads, ..	Fayette.

DR. WM. FREAR, State College, Center County, Pa.

Will attend all meetings in the First Section from Dec. 18 to Jan. 6.

DR. J. H. FUNK, Boyertown, Berks County, Pa.

Will attend Farmers' Institutes in the Fifth Section November 20 to December 23; Movable Institute Schools January 1 to February 13, and Farmers' Institutes in the Second Section from March 1 to March 7.

SHELDON W. FUNK, Boyertown, Berks County, Pa.

Will attend all meetings in the First Section from November 27 to December 12, January 15 to January 23, February 19 to February 24; Fifth Section, February 5 to February 10, and in the Second Section from March 8 to March 16.

PROF. FRANK D. GARDNER, State College, Center County, Pa.

	Date.	Place	County.
Nov.	20-21,.....	Beechwood Pres. Ch.,...	Jefferson.
Nov.	22-23,.....	Clover Grange Hall,...	Jefferson.
Nov.	24-25,.....	St. Marys, ...	Elk.

H. M. GOODERHAM, Patton, Cambria County, Pa.

Will attend all meetings in the Third Section from January 1 to January 20.

C. L. GOODLING, State College, Center County, Pa.

Jan.	10-11,.....	Halls, ...	Lycoming.
Jan.	12-13,.....	Warrensville, ...	Lycoming.
Jan.	15-16,.....	Limestone Church,...	Lycoming.
Jan.	17-18,.....	McElhattan, ...	Clinton.
Jan.	19-20,.....	Loganton, ...	Clinton.

JOEL A. HERR, Millhall, Clinton County, Pa.

Dec.	15-16,.....	Colley, ...	Sullivan.
Dec.	18-19,.....	Dushore, ...	Sullivan.
Dec.	20-21,.....	Mill City, ...	Wyoming.
Dec.	22-23,.....	Tunkhannock, ...	Wyoming.
Feb.	19-20,.....	Ellittsburg, ...	Perry.
Feb.	21-22,.....	Newport, ...	Perry.
Feb.	23-24,.....	Roseglan, ...	Perry.

E. K. HIBSHMAN, Ephrata, Lancaster County, Pa.

Jan.	1-2,.....	Camptown, ...	Bradford.
Jan.	3-4,.....	New Albany, ...	Bradford.
Jan.	5-6,.....	Ulster, ...	Bradford.
Jan.	8-9,.....	Gillett, ...	Bradford.
Jan.	15-16,.....	Limestone Church, ...	Lycoming.
Jan.	17-18,.....	McElhattan, ...	Clinton.
Jan.	19-20,.....	Logantown, ...	Clinton.
Jan.	22-23,.....	Middletown, ...	Dauphin.

GEO. E. HULL, Transfer, R. F. D., Mercer County, Pa.

Jan.	1-2,.....	Charlesville, ...	Bedford.
Jan.	3-4,.....	New Enterprise, ...	Bedford.
Jan.	5-6,.....	Fishertown, ...	Bedford.

HOMER W. JACKSON, State College, Center County, Pa.

Nov.	20-21,.....	Fordyce, ...	Greene.
Nov.	22-23,.....	Taylortown, ...	Greene.
Nov.	24-25,.....	Mt. Bethlehem U. P. Beaver. Church.	

J. B. JOHNSTON, New Wilmington, Lawrence County, Pa.

	Date.	Place	County.
Feb.	26-27,.....	Fredonia, ...	Mercer.
Feb.	28-29,.....	Jackson Centre, ...	Mercer.
March	1-2,.....	Jackson Centre, ...	Mercer.

A. J. KAHLER, Hughesville, Lycoming County, Pa.

Nov.	20-21,.....	Beechwood Pres. Ch.,..	Jefferson.
Nov.	22-23,.....	Clover Grange Hall, ..	Jefferson.
Nov.	24-25,.....	St. Marys, ...	Elk.
Jan.	29-30,.....	Cross Roads, ...	York.
Jan. 31,	Feb. 1,.....	Red Lion, ...	York.
Feb.	2-3,.....	Hellam, ...	York.

R. P. KESTER, Grampian, Clearfield County, Pa.

Will attend all meetings in the Fifth Section (Part 1).

FRANK KLINE, Spring City, Chester County, Pa.

Jan.	15-16,.....	Hummelstown, ...	Dauphin.
Jan.	17-18,.....	Linglestown, ...	Dauphin.
Feb.	26-27,.....	Bustleton, ...	Philadelphia.

L. W. LIGHTY, East Berlin, Adams County, Pa.

Will attend all meetings in the Third Section.

PROF. T. I. MAIRS, State College, Center County, Pa.

Dec.	18-19,.....	Quarryville, ...	Lancaster.
Dec.	20-21,.....	Lampeter, ...	Lancaster.
Dec.	22-23,.....	Paradise, ...	Lancaster.
Jan.	29-30,.....	Williamsburg, ...	Blair.
Jan. 31,	Feb. 1,.....	Tyrone, ...	Blair.
Feb.	2-3,.....	Burnside, ...	Clearfield.

M. H. McCALLUM, Wernersville, Berks County, Pa.

Will attend all meetings in the First Section from January 15 to January 23 and February 26 to March 16 and the Fifth Section from January 29 to February 24.

C. C. McCURDY, Hartstown, Crawford County, Pa.

Will attend all meetings in the Second Section from January 1 to January 13, and the Third Section from February 16 to March 2.

M. S. McDOWELL, State College, Center County, Pa.

March	11-12,.....	Uniondale, ...	Chester.
March	13-14,.....	Kimberton, ...	Chester.
March	15-16,.....	Cedarville, ...	Chester.

W. H. McINTIRE, State College, Center County, Pa.

Date.	Place	County.
Jan. 1-2,.....	Camptown, ...	Bradford.
Jan. 3-4,.....	New Albany, ...	Bradford.
Jan. 5-6,.....	Ulster, ...	Bradford.

PROF. FRANKLIN MENGES, York, York County, Pa.

Will attend all meetings in the First Section.

R. V. MITCHELL, State College, Center County, Pa.

Will attend all meetings in the First Section from January 1 to January 13.

MRS. GEO. E. MONROE, Dryden, N. Y.

Will attend Farmers' Institutes in the Fourth Section from January 17 to January 20 and Movable Institute Schools from January 3 to January 15.

D. E. MURRAY, Catawissa, Columbia County, Pa.

Will attend all meetings in the Fifth Section from January 1 to January 20 and in the First Section January 29 to February 17.

C. E. MYERS, State College, Center County, Pa.

Dec. 15-16,.....	Colley, ...	Sullivan.
Dec. 18-19,.....	Dushore, ...	Sullivan.
Dec. 20-21,.....	Mill City, ...	Wyoming.
Dec. 22-23,.....	Tunkhannock, ...	Wyoming.
Jan. 29-30,.....	Oakdale, ...	Allegheny.
Jan. 31, Feb. 1,.....	Pine Creek Church, ...	Allegheny.
Feb. 2-3,.....	Tarentum, ...	Allegheny.

CHAS. F. NOLL, State College, Center County, Pa.

Feb. 5-6,.....	Kittanning, ...	Armstrong.
Feb. 7-8,.....	Worthington, ...	Armstrong.
Feb. 9-10,.....	Saxonburg, ...	Butler.

H. W. NORTHUP, Dalton, R. F. D., Lackawanna County, Pa.

Dec. 4,.....	Farmers Valley, ...	McKean.
Dec. 5,.....	Wrights, ...	McKean.
Dec. 6,.....	Rich Valley, ...	Cameron.
Dec. 7,.....	Truman, ...	Cameron.
Dec. 8,.....	Sterling Run, ...	Cameron.
Dec. 9,.....	Sinnamahoning, ...	Cameron.
Feb. 21-22,.....	Tionesta, ...	Forest.
Feb. 23-24,.....	Foxburg, ...	Clarion.
Feb. 26-27,.....	Limestone, ...	Clarion.
Feb. 28-29,.....	Waterford, ...	Erie.
March 1-2,.....	East Springfield, ...	Erie.

PROF. WM. G. OWENS, Lewisburg, Union County, Pa.

Will attend all meetings in the Fourth Section from December 15 to December 23.

W. M. PATTON, Mosgrove, R. D. No. 2, Armstrong County, Pa.

	Date.	Place	County.
Feb.	12-13.....	Slippery Rock, ...	Butler.
Feb.	14-15.....	Evans City, ...	Butler.
Feb.	16-17.....	Ellwood City, ...	Lawrence.

J. H. PEACHEY, Belleville, Mifflin County, Pa.

Will attend all meetings in the Second Section.

T. J. PHILIPS, Atglen, Chester County, Pa.

Will attend all meetings in the First Section from February 5 to February 10 and the Fifth Section (Part 2) from February 16 to February 27.

E. L. PHILLIPS, New Bethlehem, R. D. No. 2, Clarion County, Pa.

Jan.	29-30.....	Mackeyville, ...	Clinton.
Jan. 31, Feb. 1, ...	Liberty, ...	Tioga.	
Feb.	2-3.....	Mansfield, ...	Tioga.
March	4-5.....	Atlantic, ...	Crawford.
March	6-7.....	Dicksonburg, ...	Crawford.
March	8-9.....	Teepleville, ...	Crawford.
March	11-12.....	Cooperstown, ...	Venango.
March	13-14.....	Emlenton, ...	Venango.

DR. W. T. PHILLIPY, Gratz, Dauphin County, Pa.

Will attend all meetings in the Second Section from December 19 to 23, February 5 to March 7, and in the Fourth Section from January 10 to January 20.

CHAS. H. RICH, Woolrich, Clinton County, Pa.

Jan.	29-30.....	Oakdale, ...	Allegheny.
Jan. 31, Feb. 1, ...	Pine Creek Church, ..	Allegheny.	
Feb.	2-3.....	Tarentum, ...	Allegheny.

WARREN G. ROSS, State College, Center County, Pa.

Jan	29-30.....	Hellertown, ...	Northampton.
Jan. 31, Feb. 1, ...	Mt. Bethel, ...	Northampton.	
Feb.	2-3.....	Cherryville, ...	Northampton.

B. O. SEVERSON, State College, Center County, Pa.

March	11-12.....	Cooperstown, ...	Venango.
March	13-14.....	Emlenton, ...	Venango.

ROBT. S. SEEDS, Birmingham, Huntingdon County, Pa.

Will attend all meetings in the Third Section from January 1 to February 3.

PROF. CHAS. F. SHAW, State College, Center County, Pa.

Date.	Place	County.
Dec. 4-5,.....	Newburg, ...	Cumberland.
Dec. 6-7,.....	Dry Run, ...	Franklin.
Dec. 8-9,.....	St. Thomas, ...	Franklin.

W. H. STOUT, Pinegrove, Schuylkill County, Pa.

Dec. 19-20,.....	Clear Ridge, ...	Fulton.
Dec. 22-23,.....	Locust Grove, ...	Fulton.
Feb. 26-27,.....	Freeburg, ...	Snyder.
Feb. 28-29,.....	Beavertown, ...	Snyder.
March 1-2,.....	Milroy, ...	Mifflin.

MISS SARA PHILLIPS THOMAS, No. 3413 Race Street, Philadelphia, Pa.

Jan. 29-30,.....	Mackeyville, ...	Clinton.
Jan. 31, Feb. 1,.....	Liberty, ...	Tioga.
Feb. 12-13,.....	East Berlin, ...	Adams.
Feb. 14-15,.....	Fairfield, ...	Adams.
Feb. 16-17,.....	Arendtsville, ...	Adams.

LEON OTICE VAN NOY, Troy, R. D. No. 66, Bradford County, Pa.

Will attend all meetings in the Fourth Section from November 20 to December 9; First Section from December 18 to January 23 and the Fifth Section from January 29 to February 29.

D. H. WATTS, Kerrmoor, Clearfield County, Pa.

Will attend all meetings in the Third Section from November 20 to January 20; Fifth Section (Part 2) from February 5 to February 27, and the First Section from February 28 to March 16.

R. J. WELD, Sugargrove, Warren County, Pa.

Will attend Movable Institute Schools from January 3 to February 15.

W. THEO WITTMAN, Allentown, Lehigh County, Pa.

Will attend Farmers' Institutes in the Fifth Section from November 20 to November 25; Third Section from November 27 to December 7; Second Section February 16 to March 9, and Movable Institute Schools from January 1 to February 13.

S. PAUL WOODMAN, Rushland, Bucks County, Pa.

Will attend all meetings in the Fifth Section from January 8 to January 20.

MRS. SARAH B. F. ZEIGLER, Duncannon, Perry County, Pa.

Will attend all meetings in the Third Section from December 1 to December 7 and the Second Section from March 8 to March 16.

**GENERAL LIST OF INSTITUTE LECTURERS WITH
THEIR SUBJECTS**

1911-1912

ANDERSON, H. M., New Park, Pa.:

1. Corn Culture.
2. Orchard Management.
3. Potato Culture.
4. Leguminous Crops.
5. Home Mixed Fertilizers.
6. Conservation of Soil Moisture. (25 to 30 minutes each.)

ARNY, L. W., New Britain, Pa.:

1. Fruit Growing in Pennsylvania.
2. The Management of Home Orchards.
3. Spraying and Spraying Materials.
4. Agricultural Education.
5. Farm Ethics.
6. The Maintenance of Soil Fertility. (20 to 30 minutes each.)

BAKER, D. B., Dillsburg, Pa.:

1. Human Vegetation.
2. The Gored Ox; The Farmer.
3. The Hessian Fly.
4. How can we better the Rural Home.
5. Future Possibilities.

BAKER, HUGH P., State College, Pa.:

1. What to do with the Farm Woodlot.
2. Making the Farm Woodlot Pay.
3. Growing the Forest Trees for Fuel and Fence.
4. Posts and Farm Timbers.
5. Utilization of Waste Lands by Planting of Forest Trees.
6. Preservation of Timber by Artificial Treatment.
7. Growing of Basket Willow on our Farms.

BARNITZ, CHAS. M., Riverside, Pa.:

1. Mother Hen; Her Brood and Their Care.
2. The Chick from Shell to Maturity.
3. Turkey Raising; How to Succeed.
4. Artificial Incubation and Brooding.
5. Common Diseases of Poultry; Their Prevention and Cure.
6. Poultry Parasites: Their Description and Destruction.
7. Best Farm Breeds and Their Needs.
8. Feeding for Winter Eggs and Fancy Flesh.
9. The Modern Poultry House; Its Location, Construction and Furniture.
10. The Essentials of True Happiness. (Evening.) (30-40 minutes each.)

BOND, M. S., Danville, Pa.:

1. Thirty-five Years' Experience with Commercial Fertilizers.
2. Potato Culture.
3. Some of the Problems as to use of Lime.
4. Intensive Agriculture.
5. Why do the Boys and Girls leave the Farm.
6. Results of Farmers' Organizations. (20 to 30 minutes each.)

BONSTEEL, F. E., Bear Lake, Pa.:

1. Potato Culture.
2. Use of Fertilizers.
3. Feeding and Care of Dairy Cattle.
4. Farm Butter-making.
5. Reclaiming a Deserted Farm in Pennsylvania.
6. Soil Management.
7. The Right Use of Lime.
8. Underdraining with Tile.
9. The Choice of Farm Machinery. (30-40 minutes.)

BURNITE, MISS MARY A., No. 132 Broad St., Newark, N. J.:

1. Fireless Cooker. (Illustrated.)
2. Denatured Alcohol Utilities. (Illustrated.)
3. Home Economics.
4. Sanitation; Evils of House Fly, Its Destruction.
5. Hygiene.
6. Dietetics—Nutrition.
7. Child Nutrition.
8. Care of Milk in the Home.

CAMPBELL, J. T., Hartstown, Crawford County, Pa.:

1. Poultry, Houses and Fixtures. (40 to 50 minutes each.)
2. Poultry, The Breeds and Breeding.
3. Poultry, Foods and Feeding.
4. Poultry, Incubators and Brooders.

5. Poultry, Feeding and Care of Little Chix.
6. Poultry, Lice, Gapes and Diseases.
7. Poultry, The Business Side.
8. The Basic Principles of Soil Improvement, Drainage, Lime, etc.
9. Economic Maintenance of the Productive Power of the Soil.
10. The Making of the Soil. (Illustrated by lantern slides.)
11. The Farm of Life. (Evening lecture.) (60 minutes.)

CARD, FRED W., Sylvania, Pa.:

1. Nature's Laboratory; The Soil.
2. Propagation, Planting and Care of Fruit Trees.
3. Digging for Dollars in the Orchard.
4. The Peach Orchard.
5. Business Methods for the Farm.
6. Some Sound and Unsound Investments.
7. Pigs and Pin-money.
8. The Call of the Land. (Primarily for young people.)
9. What Shall We Teach. (Evening.)
10. Some Things Outside the Farmyard Gate. (Evening.)

CARTER, MISS ARABELLA, No. 1305 Arch St., Philadelphia, Pa.:

1. Duty of Cheerfulness.
2. Successful Success.
3. Women in Business.
4. Cranks.
5. Mothers as Chums.
6. Little Ways of Saving.
7. Home Life on the Farm. (15-20 minutes.)

CLARK, M. N., Claridge, Pa.:

1. Marketing the Products of the Farm.
2. To Grow the Peach Successfully.
3. Some of the Mistakes Many Farmers Make.
4. Theory and a Practical Education.
5. Has the Grange Helped the Farmer.
6. A Money Maker, "Grow Hogs."
7. What Has Become of the Horse Growers.
8. Beautify the Home and Surroundings. (25 to 30 minutes each.)

COCHEL, PROF. W. A., State College, Pa.:

1. Fattening Cattle in Pennsylvania.
2. Feeding Horses for Work.
3. The Plea for Sheep in Pennsylvania.
4. Silage as a Factor in Making Economical Rations for Fattening and Growing Animals.
5. Breeding and Management of Hogs.
6. Feeding Hogs for Market.

CONARD, DR. M. E., Westgrove, Pa.:

1. Economical Production of Market Milk.
2. Essential Points in the Production of Wholesome Milk and Why?
3. Testing Milk for Butter Fat—Demonstration.
4. Pasteurization and What it Does for the Dairyman.
5. Selecting, Feeding and Raising the Calf to Build up the Dairy Herd.
6. Cow Stable Construction, Cement Floors for Comfort and Cleanliness.
7. Selecting and Breeding Horses for Farm and Market.
8. Some of the Common Causes of Lameness and How They May Be Prevented.

COOKE, PROF. WELLS W., U. S. Department of Agriculture, Washington, D. C.:

1. Commercial Fertilizers, Their Purchase and Use.
2. Testing Milk and Its Products.
3. Alfalfa Growing in Pennsylvania.
4. Economical Feeding of Farm Stock.
5. The Restoration and Preservation of a Worn Out Soil.
6. The Most Profitable Use of the Silo.
7. The Effect of Feed on the Quantity and Quality of the Milk.
8. Nature Study in the Public Schools.
9. The Economical Feeding of the Farmer's Family.

COOK, WALTER A., State College, Pa.:

1. Feeding Dairy Cattle.
2. Farm Butter Making.
3. The Value of Cow Testing Associations.
4. The Babcock Milk Tester. (20-30 minutes each.)

CORNMAN, CHAS. T., Carlisle, Pa.:

1. Practical Poultry Houses and Appliances.
2. Eggs and What They Mean to the Farmer.
3. Pure Bred Poultry; Does It Pay.
4. How Best to Improve Farm Flocks.
5. The Turkey Problem in Pennsylvania.
6. Our Nature Birds; Their Value to the Farm. (30 minutes each.)

DETRICH, DR. J. D., No. 438 Adams Ave., Scranton, Pa.:

1. How to Keep Twenty Head or More of Dairy Animals on Fifteen Acres.
2. Twenty-five Years' Experience in Soiling.
3. Sixteen Years' Experience With the Wooden Silo.
4. How to Grow Crops on a Fifteen Acre Farm and no Fertilizer.
5. Feed, Breed and Care of the Dairy.

6. Farmers, Raise Your Own Cows, But Buy Your Own Bull.
7. The Agricultural College and the Farmer.
8. The Farmers' Waste Basket.
9. The Small Farm vs. The Large Farm.
10. Bench, Book and Farm.
11. How to Raise Crops Without Weeds.

DORSETT, E. B., Mansfield, Pa.:

1. Selection of the Dairy Cow.
2. Building up the Dairy Herd.
3. Feed and Care of the Dairy Cow.
4. The Silo and Its Use.
5. Co-operation for the Farmer.
6. Organization for the Farmer.
7. The Real Factors of the Country Home.
8. America's Uncrowned Queen.

DRAKE, W. M. C., Volant, Pa.:

1. How to Grow Clover.
2. Corn Breeding and Selection of Seed.
3. Breeding, Feeding and Care of Sheep.
4. The Use of Commercial Fertilizer.
5. Raising Horses in Pennsylvania.
6. Growing Potatoes.
7. Growing Orchard Fruits.
8. The Farmer's Poultry Plant.
9. The Future Farmer's Education.
10. Home Influence. (40-50 minutes each.)

ESCHBACH, I. A., Milton, Pa., R. D. No. 1.:

1. Value of Fertility.
2. Importance of Livestock on Pennsylvania Farms.
3. Silos and Silage.
4. Farm Homes and Conveniences.
5. The Education of Farmer's Boys.
6. Farmers' Roads and How to Improve Them.
7. Farm Weeds and Some Methods To Control Them. (20-30 minutes each.)

FASSETT, F. H., Meshoppen, Pa.:

1. Care and Management of the Orchard.
2. Pruning.
3. Spraying and Marketing.
4. Budding and Grafting.
5. Some Orchard Insects and Remedies.
6. Strawberries.
7. Peaches. (30-40 minutes each.)

FOULKE, MRS. JEAN KANE, West Chester, Pa.:

1. The Women's Future; Difficulties and Possibilities. (30-40 minutes.)
2. Our Neglected Opportunities. (25 to 35 minutes.)
3. "Little Orphan Annia," or the Child of the Farm. (30 minutes.)
4. Cheap and Easy Means to Health and Comfort. (25 to 40 minutes.)
5. The Essentials of Butter Making. (30 minutes.)
6. Barn Buildings, Old and New. (30 minutes.)
7. Weeds; How to Grow Them and How Not to Grow Them. (30 minutes.)
8. The Women's Place in the Farm Life. (30 minutes.)
9. Independence and Interdependence.

FULTON, H. R., State College, Pa.:

1. Potato Blights. (20-40 minutes.)
2. Grain Smuts. (20-40 minutes.)
3. Apples Diseases. (20-40 minutes.)
4. Ways of Controlling Plant Diseases. (Evening lecture.) (40-60 minutes.)
5. Peach Diseases. (20-40 minutes.)
6. Some Truck Crop Diseases. (20-40 minutes.)

FREAR, DR. WM., State College, Pa.:

1. Fertilizer Economics.
2. Accumulation and Uses of Humus.
3. Condimental Stock Foods; Their Uses and Abuses.
4. Selection of Seed Corn. (30 minutes.)
5. The Gain in Soil Nitrogen Resulting From the Use of Leguminous Crops.
6. The Value of Limestone Compared With Lime for Soil Improvements.
7. Pennsylvania Experience in Growing Sumatra-type Tobacco. (20 minutes each.)

FUNK, DR. J. H., Boyertown, Pa.:

1. Commercial Orchardling. (45 minutes.)
2. Pruning, Fertilizing and Thinning. (45 to 60 minutes.)
3. Spraying. (45 minutes.)
4. San Jose Scale and Other Insects. (45 minutes.)
5. Small Fruits. (45 minutes.)
6. The Peach and How to Raise It. (45 minutes.)
7. How a Tree Grows. (Suitable for Schools.) (45 minutes.)
8. Potato Culture. (45 to 60 minutes.)
9. Birds and Insects. (Evening Lecture.) (45 to 60 minutes.)

FUNK, SHELDON W., Boyertown, Pa.:

1. Potato Culture.
2. Market Gardening.
3. Modern Peach Culture.

4. Small Fruit Culture.
5. Flowers and Their Care in the Home and Lawn.
6. The Spraying of Fruit Trees.
7. Apple Growing in Pennsylvania.
8. An Appeal To Our Farmers' Boys. (Evening.) (30 to 50 minutes each.)

GARDNER, PROF. FRANK D., State College, Pa.:

1. Corn Improvement by Selection, Breeding and Testing.
2. Principles of Applying Fertilizers.
3. Soil Fertility and How to Maintain It.
4. Alfalfa and How to Grow It.
5. Land Drainage.
6. Concrete for Farm Buildings. (30 minutes each.)

GOODERHAM, H. M., Patton, Pa.:

1. Barn Manures; Their Waste and Treatment. (30 to 40 minutes.)
2. Agriculture in Our Rural Schools. (20 to 30 minutes.)
3. Pure Breeds vs. Mongrels. (20 to 25 minutes.)
4. Butter Making on the Farm. (30-40 minutes.)
5. Growing Alfalfa. (20 to 25 minutes.)
6. The Boys and the Girls. (Evening.) (35 to 40 minutes.)

GOODLING, C. L., State College, Pa.:

1. Economic Production of Milk.
2. Cow Testing Associations.
3. Silos and Their Value.
4. Selection and Breeding of Cattle.
5. Some Experimental Results. (20 to 30 minutes each.)

HERR, JOEL A., Millball, Pa.:

1. Intelligent Use of Commercial Fertilizers. (30 minutes.)
2. Modern Road Making. (20 minutes.)
3. Building Up the Farm. (30 minutes.)
4. Selection and Breeding of Dairy Cows. (20 minutes.)
5. The Bright Side of Farm Life. (35 minutes.)
6. What Has Organization Done for the Farmer. (30 minutes.)
7. The Farmer As a Citizen. (20 minutes.)
8. Raising Cows for Market. (20 minutes.)
9. Specialities in Farming. (30 minutes.)
10. The Clover Crop. (30 minutes.)
11. The Value of a Wood Lot. (15 minutes.)

HIBSHMAN, E. K., Ephrata, Pa.:

1. History of Tobacco (30 minutes.)
2. Tobacco Culture. (30 minutes.)
3. Tobacco Breeding. (45 minutes.)
4. Lime. (30 minutes.)
5. Clover Crops. (30 minutes.)
6. Alfalfa. (30 minutes.)
7. Soil Improvement. (30 minutes.)

HULL, GEO. E., Transfer, Pa., R. D.:

1. Producing and Marketing Clean Milk. (25 minutes.)
2. Making and Marketing Good Butter. (30 minutes.)
3. History of Five of the Popular Breeds of Dairy Cows. (25 minutes.)
4. Homemade Silos; When and How to Fill. (25 minutes.)
5. Construction for Convenience in the Dairy Barn. (20 minutes.)
6. Getting Along on the Farm. (30-40 minutes.)
7. Our Farm Homes. (30 minutes.)

JACKSON, HOMER W., State College, Pa.:

1. Farm Poultry.
2. Winter Eggs.
3. Artificial Incubation and Brooding.
4. Hatching and Raising Chicks With Hens.
5. Poultry Houses.
6. Breeds of Poultry.
7. Going Into the Chicken Business. (Evening lecture.)
8. Poultry Diseases.

JOHNSTON, J. B., New Wilmington, Pa.:

1. Picking, Packing and Storing Apples. (20 minutes each.)
2. Results of Fertilizer Experiments.
3. Spraying—When—How—and What For.
4. Is there Danger of the Fruit Business Being Overdone?

KAHLER, A. J., Hughesville, Pa.:

1. Soil Fertility.
2. Corn Culture and Corn Breeding.
3. Hogs for Profit.
4. Experience with Lime and Commercial Fertilizer.
5. Give the Boys a Chance.
6. Centralization of Schools in Rural Districts.
7. Taxation. (20 to 30 minutes each.)

KESTER, R. P., Grampian, Pa.:

1. Fertility; Regained and Retained. (45 minutes.)
2. Making the Dairy Pay. (30 minutes.)
3. Economical Feeding of the Dairy Cow. (30 minutes.)
4. Planting and Care of Fruit Trees. (30 minutes.)
5. Success with Small Fruits. (30 minutes.)
6. Essentials of Success with Potatoes. (30 minutes.)
7. Spraying; How, When, What and Why? (45 minutes.)
8. The Farmer As a Citizen. (Evening lecture.) (40 minutes.)
9. The Education We Need. (Evening lecture.) (45 minutes.)
10. Some Fundamentals of a Country Home. (Evening lecture.) (45 minutes.)

KLINE, FRANK, Spring City, Pa.:

1. Incubation with Hens and Incubators.
2. Brooding and Rearing Chicks for Market and Breeders.
3. Poultry Buildings, Past and Present.
4. Profitable Poultry and Winter Egg Producers.
5. Interest the Boy in Poultry and Keep Him on the Farm. (25 to 45 minutes each.)

LIGHTY, L. W., East Berlin, Pa.:

1. Dairying As a Business.
2. The Silo As a Factor on the Dairy Farm.
3. Soiling Crops; How to Handle and Feed Them.
4. Culture and Feeding of the Corn Crop.
5. Producing and Selling Good Milk, Cream and Butter.
6. Value, Care and Handling of Farm Manure.
7. Maintaining and Improving the Fertility of the Soil.
8. The Farm Home As It Should Be.
9. The Rural School As It Should Be. (30-45 minutes.)

MAIRS, PROF. T. I., State College, Pa.:

1. Horse Breeding for Farmers. (20-30 minutes.)
2. Livestock and Soil Fertility. (20-30 minutes.)
3. What Is a Balanced Ration. (15-25 minutes.)
4. School Training for Farm Life. (30-40 minutes.)
5. Rural Sanitation and Hygiene. (20-30 minutes.)
6. Some Rural School Problems. (20-30 minutes.)
7. Alfalfa. (20-30 minutes.)

McCALLUM, M. H., Wernersville, Pa.:

1. Alfalfa. (30-40 minutes.)
2. Essentials for Success with the Potato. (30 minutes.)
3. Market Gardening. (30 minutes.)
4. Commercial Fertilizers; Their Buying, Mixing and Use. (30-40 minutes.)
5. Forms and Uses of Lime. (30 minutes.)
6. The Value of Home Experiments. (20-30 minutes.)
7. Things to Live For on the Farm. (30 minutes.)

McCURDY, C. C., Hartstown, Pa.:

1. Hatching and Raising Little Chicks. (30 minutes.)
2. Profitable Poultry on the Farm. (30 minutes.)
3. Seed Corn; Selection and Improvement. (25 minutes.)
4. Corn Culture. (25 minutes.)
5. Essentials of Successful Potato Growing. (30 minutes.)
6. Practical Methods of Improving the Soil. (25-30 minutes.)

McDOWELL, M. S., State College, Pa.:

1. Soil Fertility.
2. Lime.
3. A Few Facts About Bacteria.
4. Insoluble Phosphate.
5. Known and Unknown.

McINTIRE, W. H., State College, Pa.:

1. The Sources and Uses of Lime.
2. Humus.
3. Some Points on Soil Analysis.
4. Various Forms of Phosphate and Their Availability. (30 minutes.)

MENGES, PROF. FRANKLIN, No. 233 Philadelphia St., York, Pa.:

1. Maintenance of Soil Fertility and Soil Moisture.
2. Fixation of Free Nitrogen and Soil Bacteria by Legumes.
3. Methods of Introducing Clovers into Rotations.
4. Methods of Raising Hay.
5. Economy In Crop Production for Food Humus and Fertility.
6. Benefits of Corn Breeding.
7. Wheat Raising To Increase Yields.
8. Industrial Alcohol in Agriculture.
9. The Necessity of Education For the Farmer.
10. Domestic Chemistry in the Country School.
11. Insect Life in Agriculture.

MITCHELL, R. V., State College, Pa.:

1. Methods of Rearing Young Chicks.
2. Poultry House Construction.
3. Marketing Poultry and Eggs.
4. Fattening Poultry for Market.
5. Improvement of Farm Poultry.
6. Killing, Dry Picking and Packing Poultry. (Demonstration.)
7. Poultry Farms. (Illustrated.)
8. Western Methods of Fattening, Killing and Packing Poultry. (Illustrated.)

Note:—Any of the above talks can be accompanied with lantern slides.

MONROE, MRS. GEO. E., Dryden, N. Y.:

1. Farm Poultry.
2. Rearing of Chick and Housing.
3. Selection of Breeding Stock and Feeding for Eggs.
4. Farm Sanitation.
5. The Farmer's Children at School. (30-40 minutes each.)

MURRAY, D. E., Catawissa, Pa.:

1. Restoring the Farm Orchard.
2. Insect Pests.
3. Planting a Young Orchard.

4. Pruning.
5. Spraying.
6. Some Diseases Which Attack Our Fruit Trees and How to Control Them.
7. Economic Aspects of Some Insects.
8. Fruit Growing in Pennsylvania.
9. Our Birds.
10. Nature's Story in Leaf and Flower. (Evening lecture.)
11. Insect Life. (Illustrated by charts.) (Evening lecture.) (35-45 minutes.)

MYERS. C. E., State College, Pa.:

1. Agricultural Education. (35 minutes.)
2. The Improvement of Farm Crops By Breeding. (40 minutes.)
3. Potato Culture. (1 hour.)
4. Cabbage, Tomatoes and Asparagus. (30-40 minutes.)
5. Humus, Its Relation to Crop Production. (30-40 minutes.)
6. Insects and Insecticides. (30-40 minutes.)

NOLL, CHAS. F., State College, Pa.:

1. Lime and Liming. (30 minutes.)
2. Commercial Fertilizers. (35 minutes.)
3. Selection and Care of Seed Corn. (30 minutes.)
4. Weeds and Weed Seeds. (25 minutes.)

NORTHUP, H. W., Dalton, Pa.:

1. Selection; Care and Management of the Dairy.
2. Practical Experience with the Silo.
3. Potato Growing.
4. The Exhaustion and Restoration of Our Soil.
5. Fruit Culture With Modern Improvements.
6. Farm Products and How to Market Them.
7. Nature Study for Country Schools.
8. Educating the Farmer and Increasing His Usefulness.
9. Desirable Country Houses and How to Enjoy Them. (30 minutes each.)

OWENS, PROF. WM. G., Lewisburg, Pa.:

1. Conservation on the Farm. (30 minutes.)
2. Care in the Production and Handling of Milk. (30 minutes.)
3. Sanitation on the Farm. (30 minutes.)
4. Formation and Improvement of Soils. (30 minutes.)
5. Manures and Their Values. (30 minutes.)
6. The Education a Farmer Needs. (60 minutes.)
7. The Country School and Its Teacher. (60 minutes.)
8. Weeds and the Farmer. (30 minutes.)

PATTON, WM. M., Mosgrove, Pa., R. F. D. No. 2.:

1. The Planting and Care of the Farm Orchard.
2. Lime; How, When and For What to Use It.
3. The Possibilities of Alfalfa and How to Grow It.

4. The Neat Farmer and His Influence.
5. Clover Growing as a Soil Renovator.
6. Hog Feeding for Profit.
7. Reclaiming the Run Down Farm. (30-60 minutes.)

PEACHEY, J. H., Belleville, Pa.:

1. Alfalfa.
2. Butter Making on the Farm.
3. Horse Breeding for the Farmers.
4. Corn Culture.
5. The Clover Crop and How We Grow It.
6. Soil Fertility.
7. Selling Farm Products.
8. The Home on the Farm. (Evening lecture.)
9. The Problem of Education for Country Children. (Evening lecture.)
10. Goodby, Take Care of the Farm. (Evening lecture.) 30-45 minutes.)

PHILIPS, T. J., Atglen, Pa.:

1. Economy in Dairy Feeding.
2. The Silo.
3. Little Things in Poultry Keeping.
4. Barn Manure; Its Best Uses.
5. Green Manural Crops.
6. Lime, How and When to Apply.
7. Commercial Fertilizers; Their Nature and Uses.
8. Potato Growing a Specialty.

PHILLIPS, E. L., New Bethlehem, Pa., R. D. No. 2.

1. Construction of Poultry Houses.
2. Beginning the Poultry Business.
3. How to Buy Commercial Fertilizer and How to Use It.
4. The Need of Lime in the Soil.
5. Good Roads; How to Get Them.

PHILLIPY, DR. W. T., Gratz, Pa.:

1. Soils; Their Management and Fertility.
2. Corn Selection and Culture.
3. Alfalfa.
4. Potato Culture.
5. Poultry on the Farm.
6. Up-to-date Dairying.
7. Practical Fruit Growing. (35 to 45 minutes each.)
8. The Most Imperative Duties of Our People. (Evening lecture.)
9. The Old Farm. (Evening lecture.) (45 minutes.)

RICH, CHAS. H., Woolrich, Pa.:

1. Horticulture.
2. Milk and Milk Products.
3. Chemistry and Physics the Farmer Should Know.

4. Home Sanitation.
5. Essentials to Success and Happiness on the Farm.
6. Natural and Industrial Harmony.
7. Roads; Get Out of the Mud.

ROSS, W. G., State College, Pa.:

1. More and Better Corn.
2. Some Essentials for Success with Potatoes.
3. The Right Use of Commercial Fertilizers. (20 to 30 minutes each.)

SEVERSON, B. O., State College, Pa.:

1. Feeding Steers.
2. Profitable Hog Feeding.
3. Sheep Management.
4. Horse Breeding. (30 minutes.)

SEEDS, ROBT. S., Birmingham, Pa.:

1. Value of Barnyard Manure. (30 minutes.)
2. Soil Improvement. The Keystone to Agriculture. (30 minutes.)
3. The Value of Fertility and Cheapest Way to Get It.
4. Education and the Farmer. (20 minutes.)
5. Benefits derived from Farmers' Institutes. (20 minutes.)
6. What Constitutes a Country Home. (45 minutes.)
7. Mistakes of Life Exposed. (60 minutes.)

SHAW, PROF. CHAS. F., State College, Pa.:

1. Soils in Northwestern Pennsylvania; Their Character, Needs and Crop Adaptations. (30-60 minutes.)
2. Soils in Southwestern Pennsylvania; Their Character, Needs and Crop Adaptations. (30-60 minutes.)
3. Soils in Central Pennsylvania; Their Character, Needs and Crop Adaptations. (30-60 minutes.)
4. Soils in Southeastern Pennsylvania; Their Character, Needs and Crop Adaptations. (30-60 minutes.)
5. Soil Management. (30-60 minutes.)
6. The Need and Use of Lime. (30-60 minutes.)
7. Saving the Soil Moisture. (30-60 minutes.)

STOUT, W. H., Pinegrove, Pa.;

1. Manure and Fertilizers.
2. Bee Keeping.
3. Fruit Growing.
4. Geological Observations.
5. Potato Culture.
6. Alfalfa and Soil Inoculation.
7. Experience in Improving Poor Soil.
8. Unfair Taxation and Remedy. (30 minutes each.)

THOMAS, MISS SARA PHILLIPS, No. 3412 Race St., Philadelphia, Pa.:

1. The Workshop of Our Homes.
2. Practical Helps and Useful Suggestions.
3. Some Phases of Sanitation.
4. Domestic Economy.
5. The Enlargement of Women's Sphere. (Evening.) (60 minutes.)
6. Gleanings from Other Countries. (Evening.) (60 minutes.)
7. Health and Simple Ways of Keeping and Restoring It.
8. The Conservation of Our Boys and Girls.

TYSON, CHESTER J., Floradale, Pa.:

1. Handling the Apple Crop.
2. Renewing the Orchard.
3. Orchard Management; Locating, Planting, Management, Spraying, etc.

VAN NOY, LEON OTICE, Troy, Pa., R. F. D. No. 66.:

1. How to Lay a Foundation for a Dairy Herd.
2. Feed and Care of the Dairy.
3. Making Butter on the Farm. (30 minutes each.)
4. The Silo. (25 minutes.)
5. Swine as a Side Line with the Dairy. (20 minutes.)
6. Soil Fertility. (30 minutes.)
7. The Care of Milk. (20 minutes.)
8. How the Co-operations Look at the Farmer. (Evening.) (45 minutes.)
9. Farmers vs. Other Occupations. (For young people.) (Evening.)

WATTS, D. H., Kerrmoor, Pa.:

1. Starting an Apple Orchard.
2. Cultural Treatment of the Orchard.
3. Insect Pests; Spraying.
4. Peach Culture.
5. Building up the Dairy Herd for Profit.
6. Feed and Care of the Herd.
7. How to Make and Seal Gilt Edge Butter.
8. Alfalfa; Its Value and Culture.
9. The Farmer and the Road Problem.
10. Farm Buildings and Blunders. (Evening.)
11. Our Education. (Evening.) (20-40 minutes.)

WELD, R. J., Sugargrove, Pa.:

1. The Selection and Breeding of Dairy Herd. (30 minutes.)
2. Feeding the Dairy Herd. (30 minutes.)
3. The Babcock Test on the Dairy Farm. (20 minutes.)
4. Records Necessary to the Building of a Dairy Herd. (30 minutes.)
5. Butter Making on the Farm. (30 minutes.)
6. Crops for the Dairy Farm. (20 minutes.)

WITTMAN, W. THEO, Allentown, Pa.:

1. Poultry; Knowing More About the Business. (40 minutes.)
2. Poultry; Breeding. (30 minutes.)
3. Poultry; Housing. (30 minutes.)
4. Poultry; Feeding. (30 minutes.)
5. Poultry; Incubation and Rearing. (30 minutes.)
6. Poultry; Making Hens Lay in Winter. (30 minutes.)

WOODMAN, S. PAUL, Rushland, Pa.:

1. Economical Use and Care of Barnyard Manure.
2. Peaches; How to Grow Them.
3. Clover Culture.
4. Care and Management of the Farmers' Orchard.
5. Profitable Dairying.
6. The San Jose Scale.
7. Commercial Fertilizers.

ZEIGLER, MRS. SARAH B. F., Duncannon, Pa.:

1. Practical Ways for Farmers' Wives to Make Money. (20 minutes.)
2. Our Country Homes. (25 minutes.)
3. The Wife a Partner. (30 minutes.)
4. Some Lessons from Nature. (30 minutes.)
5. The Social Side of Farm Life. (30 minutes.)
6. The Farmer of the Future in the Child of To-day. (25 minutes.)
7. Home Sanitation.

LIST OF SPECIAL INSTITUTE INSTRUCTORS.

Prof. Alva Agee, State College, Pa.
 John W. Cox, New Wilmington, Pa.
 Wm. T. Creasy, Catawissa, Pa.
 Dr. Carl W. Gay, Philadelphia, Pa.
 Prof. H. R. Fulton, State College, Pa.
 Prof. C. W. Larson, State College, Pa.
 J. H. Ledy, Marion Pa.
 J. W. Bruckart, Lititz, Pa.
 W. F. Hill, Huntingdon, Pa.
 Frank Kline, Spring City, Pa.
 Dr. Louis A. Kline, University of Pennsylvania, Philadelphia, Pa.
 A. W. Stephens, Mooresburg, Pa.
 Dr. E. E. Tower, Hallstead, Pa.
 T. J. Wagner, Harrison City, Pa.
 Prof. R. L. Watts, State College, Pa.
 Prof. H. E. Van Norman, State College, Pa.
 Chester J. Tyson, Floradale.

DEPARTMENT LECTURERS.

In so far as time and circumstances will permit, the officers of the Department of Agriculture are desirous of engaging in Institute work.

In order to prevent disappointment in the arrangement of programs, it is recommended that Institute Managers first consult the individual whose services they may wish to secure, before placing his name on the program.

Department lecturers come to these Institutes free of charge, except that they are to be taken from and to the railroad station at the expense of local manager. The topics which they will discuss can be procured by addressing the following officers of the Department of Agriculture:

HON. N. B. CRITCHFIELD, Secretary of Agriculture.

HON. A. L. MARTIN, Deputy Secretary and Director of Institutes.

JAMES FOUST, Dairy and Food Commissioner.

PROF. H. A. SURFACE, Economic Zoologist.

DR. C. J. MARSHALL, State Veterinarian.

BIOGRAPHICAL SKETCHES OF THE INSTITUTE LECTURERS

H. M. ANDERSON was born August 26th, 1874, on the farm which he has recently purchased from his father. He graduated from the York Collegiate Institute in 1894, since which time he has devoted practically all his time to agriculture. Has been for quite a number of years growing very profitable farm crops in what has until very recent years been called the York County Barrens. He is particularly interested in growing alfalfa, potatoes and corn and is doing experimental work with these crops; has an apple orchard of which he is very proud and is a close student of modern methods of increasing soil fertility.

L. W. ARNY after receiving his early education at public schools took a four year course at Pennsylvania State College specializing in Horticulture, during the summer of which he was employed by Hoopes Bros. & Thomas of West Chester, Pa., during Scale Inspection and Spraying, together with regular Nursery Work. After spending several years as Superintendent of a farm, having charge of fruit and market gardening, he took up professional spraying and pruning of orchards. He is now engaged in farming, having purchased a 40 acre farm on which he is specializing in the fruit business, also Secretary Horticultural Association, of Bucks County.

M. S. BOND was born on a farm in Montour county, Pa., February 26, 1834; lived and worked on a farm until eighteen years old, then taught school seven years, then was employed as a freight and passenger conductor for nine years, and traveled as lost freight and car tracer and purchasing agent for the Delaware, Lackawanna and Western Railroad Company for five years. Has been for over twenty-five years engaged in farming and market gardening; during a part of this time, engaged in breeding and raising blooded Jersey cattle and still keeps some of the best in the State; has made the raising of potatoes by the thousands of bushels a specialty for twenty-five years; has been and is now using more fertilizer to the acre than any man in his county, and is now making gardening a specialty.

MISS MARY A. BURNITE was born in Felton, Del., raised on the Eastern Shore of Maryland, on a farm, which farm she still calls home. She was educated in District School and finished her academic training at Wilmington Conference Academy, Dover, Del., after which she entered Columbia University and after two years course was graduated from Household Arts Department of Teachers College. Aside from the regular Institute work she has done in Maryland, she gave a three months course in domestic science and all phases of home economics in Delhi, N. Y. She has also spent three seasons in New York State studying farm conditions, while instructor in a tuberculosis home or sanitarium.

CHARLES M. BARNITZ began the study of poultry culture twenty-five years ago and now conducts a model up-to-date poultry plant at Riverside, Pa., and is a recognized authority on poultry. His success and expert articles in the poultry press of the United States and Europe attracted the American Press Association, the greatest newspaper syndicate in the world. He accepted a place on their staff as editor and artist of their poultry feature, and his poultry writings are now read by millions of people throughout the United States. His modern and extensive plant at Riverside is a practical and profitable one, and interesting experiments with land and water fowl afford much valuable data for platform and press.

FREDERICK E. BONSTEEL was born at Huntingdon, W. Va., in 1876, of New York and New England parentage, educated at Ten Broeck Academy and Cornell University. His early life was spent on a dairy and grain farm in Western New York, with the exception of a few years practice of pharmacy. In 1900 he entered the Bureau of Soils of the U. S. Department of Agriculture as soil expert, remaining in charge of survey parties until 1905, when he was transferred to Soil Management, associated with Prof. F. D. Gardner, now of the Pennsylvania State College. In 1906 he took up editorial work along agricultural lines with Doubleday, Page & Co., of New York City, resigning that position two years later to take up the problem of reclaiming some of the worn out and practically abandoned farms of Northwest Pennsylvania on his own account. He is now operating 250 acres in dairy, stock, grain and fruit; having more than doubled the natural yields of the common crops in two years.

D. B. BAKER was born at Bermudian, Adams county, Pa., April 10, 1859. His father, who was a blacksmith, brought him at an early age to Warrington township, York county and later to a large farm south of Dillsburg, Pa. Being the oldest of a family of seven, he was kept busy rain or shine in the smithy and on the farm. He was educated in the common and select schools of the vicinity, Millersville State Normal School and Dickinson College. Has had 33 years experience in the public schools. He has taught 22 years in one room in Dillsburg, Pa. Twenty summers have been spent as school book agent in 52 counties of Pennsylvania. Lately moved to "Way-side Retreat" farm near Dillsburg, where he farms in summer and teaches school in winter.

ANDREW A. BORLAND was born and reared on a farm in Mercer county, Pa. He was educated in the public schools and at McElwain and Sandy Lake Academies. He taught in the public schools of Mercer county for seven years prior to entering the Pennsylvania State College from which institution he graduated in 1909, with the degree of B. S. in Agriculture. He received first honors upon graduation and was awarded the John White Fellowship to be used in Post Graduate work. In pursuance of this plan he spent the year 1909-10 at the University of Wisconsin, Madison, Wisconsin, where he gave special attention to dairying and was awarded the degree of M. S. in agriculture. Since graduation from the University of Wisconsin he has held the position of Assistant in Dairy Husbandry Research at the Pennsylvania State College.

FRED W. CARD was born at Sylvania, Pa., in 1863. Attended the common schools and the Mansfield State Normal, from which he graduated in 1880. He taught three years in the public schools and took a business college course, after which he spent five years in gardening and small-fruit growing. In the fall of 1889 he entered Cornell University and completed the regular course in agriculture in 1892. He was then granted a fellowship and remained for graduate work the following year, receiving his master's degree in 1893. He was appointed assistant in horticulture at the Cornell University experiment station, but resigned in a short time to become associate professor of horticulture at the University of Nebraska, remaining in this position for five years. In 1898 he became professor of horticulture at the Rhode Island College of Agriculture and Mechanic Arts, and in 1891 professor of agriculture as well. This position he resigned in 1897 to engage in actual farming on the farm where he was born, which he had purchased while in Nebraska.

J. T. CAMPBELL was born in Springfield township, Fayette county, Pa., December 18, 1872; is the son of a prominent farmer; received his early education in the public schools of his native district; left the public schools with a more than average education, and at once took up the study of agriculture at home, while working on his father's farm; he studied carefully all leading books and journals of his day. Married in 1894, and took up gardening and poultry culture, and was successful from the start. When the Pennsylvania State College started its correspondence courses in agriculture he took up the work and has since pursued same with diligence. Owns a large farm in Crawford county, upon which he has worked out many important agricultural problems. In poultry culture he has been exceptionally successful, having made it a subject of special study, together with soil physics. Keeps in close touch with the State Experiment Station and the National Department of Agriculture; has written some for various agricultural and poultry journals.

DR. MILTON E. CONARD was born in southern Chester county, in 1851, of an ancestry of successful agriculturists. He obtained his education in the public and high schools and Millersville State Normal School. He was for some years engaged in farming in his home locality; later taking the course in veterinary medicine at the University of Pennsylvania, graduating in 1891, in which institution he has for several years been lecturer of Dairy and Milk Inspection and Veterinary Obstetrics. Throughout his veterinary career he has been closely identified with dairy interests, practicing for some years in a dairy locality, and having for over ten years given his entire time as Inspector and Consulting Expert for a large number of the dairies furnishing milk to the City of Philadelphia from Pennsylvania, New Jersey, Maryland and Delaware.

M. N. CLARK was born near Export, Westmoreland county, Pa., July 16, 1848; received a good common school education, with several years at an academy and a full course at Duff's Commercial College, at Pittsburg; has always taken much delight in farming; is a close observer, and for many years has taken an active interest in agricultural affairs of his county; the cause of education has always found in him an earnest supporter; has been engaged

in general farming from boyhood, except a few years spent in selling implements; was several seasons in the fruit growing regions of the south, and there gained much information in the use of commercial fertilizers and fruit growing; was a member of the State Board of Agriculture for ten years, and at present is looking after the interest of his farm.

W. A. COOK was born and reared in one of the suburbs of Greater Boston. When he was fifteen years of age his parents moved to one of the nearby market-gardening sections, where he became thoroughly imbued with the idea of intensive agriculture that he decided to take an agricultural course at the University of Maine.

After completing his college work he accepted the position of herdsman at the well known Langwater Guernsey Farms in Massachusetts and was later made farm foreman at the same place. He left Langwater to become manager of a large dairy farm, producing certified milk for Boston, and held that position until his health broke down. Upon recovery he was appointed to his present position of Assistant in Dairy Husbandry at the State College.

ARABELLA CARTER, 1305 Arch St., Philadelphia, Pa., was born in Byberry, Philadelphia, on the farm which is yet her home. Educated at Byberry Friends' School and Swarthmore College. Interested in literary work she took a special course in journalism, securing her diploma in 1899, now being connected with the Philadelphia North American. For ten years she has been business manager of the Universal Peace Union. "Though boarding in Philadelphia she is joint owner with her brother of the old homestead and actively interested in all changes and plans for improvement. Elected school director, she is the first woman in her locality to serve in this capacity.

WELLS W. COOKE was born in Massachusetts and removed at an early age to Wisconsin. Educated in public schools and graduated in 1879 from Ripon College. Taught in public and private schools and for four years had charge of the farm work in industrial schools. Professor of Agriculture in the University of Vermont and Director of the Vermont Agricultural Experiment Station for seven years. Professor of Agriculture for seven years at the State Agricultural College of Colorado. One year at the State College of Pennsylvania in connection with the Correspondence Course in Agriculture. At present connected with the United States Department of Agriculture at Washington.

CHARLES T. CORNMAN was born in Carlisle in the year 1863. His first venture in poultry breeding was White Crested Black Polish, and he bred them for some years but has not bred them for the last twenty years. Next he selected the Dorkings and bred them for several years with but little success. For many years he had a farm devoted to the breeding of White Plymouth Rocks, Pekin Ducks, White Duchess Pigeons and White Holland Turkeys. He has judged for six years at the largest poultry shows in the United States, and the additional honor of having a gold medal of the first class and a commemorative diploma conferred on him by the Universal Exposition for his work in connection with the greatest gathering of pure-bred poultry ever seen. Last winter delivered a series of lectures on poultry culture at the University of West Virginia and has been doing considerable educational work for the Farmers' Institutes, Grange Fairs and meetings.

J. D. DETRICH'S knowledge of agriculture, as a science, dates from 1882, since which time he has been availing himself of all the bulletins, magazines and books relating to soil, crops, dairying, breeding, feeding and rearing of dairy animals. This, together with information furnished by the colleges and experiment stations, he has put into practice, and the result has been a satisfactory and profitable system of extensive farming.

W. M. C. DRAKE was born in Lawrence county, August 16, 1860. He was educated at the public schools and a Normal School at New Castle, Pa., passing a teachers' examination. He has spent all his life on the farm; was president of the Farmers' Alliance in Lawrence county one term. He has been for several years past in partnership with his brother, operating 600 acres of land, besides a market garden and an extensive orchard.

E. B. DORSETT was born on a farm in Richmond township, Tioga county, Pa., February 17, 1868. He received a common school education in the district where he lived, then attended the Mansfield State Normal School, from which he was graduated in 1896. Ten years were spent teaching during the winter months and farming during the summer. With the exception of six years spent in the Sheriff's Office at Wellsboro, he has always lived and worked on the farm. At present, he and his brother, S. C. Dorsett, own and operate a large farm in Mansfield township, making dairying a specialty. His work in the Grange as State Lecturer, has brought him in close touch with the farmers and farm operations throughout the State, and has given him a fund of knowledge that will be useful to him in his work as an institute worker.

I. A. ESCHBACH was born May 19, 1854, at Pallowfield, on the farm he now owns near Milton, Northumberland county, Pa. His education was in the common schools, with a little finishing up at Academy at McEwensville, Pa. Married at twenty-one and has always been engaged in farming, has always taken an active interest in local affairs of his section, serving as school director for thirteen successive years; served as President of Board of Directors of Milton Fair Association; is at present chairman of good roads movement in his own county and member of State Board of Agriculture in same. He has been a success as a farmer and stock raiser. Breeding-horses, cattle and sheep and hogs, together with raising all the general farm crops raised in his section. He has always taken active interest in Institute work in his county and is at home on all agricultural topics.

F. H. FASSET, Meshoppen, Pa., was born June 3, 1855, in Windham township, Wyoming county, Pa.; moved to Meshoppen township in 1869, to the farm where he now resides; was educated in the common schools and took a course in select schools in Meshoppen borough; has been actively engaged in the growing of tree fruits with marked success for the last twenty-five years; all up-to-date methods of orchard treatment, spraying and pruning have been in use; took up the business of growing small fruits for the market some 12 years ago and has met with fair success. Is President of Wyoming County Horticultural Society and in close touch with the fruit interests of this section.

JEAN KANE FOULKE was born in Wilmington, Delaware. Was educated at the Misses Hebb's School of this city. Removed to Philadelphia and became a private teacher for two years. Married George Rhyfydd Foulke in 1883 and removed to the mountains of North Carolina. After two or three years residence there they removed to the old Foulke homestead in Chester county, Pa. Here they became actively engaged in farming; joined the Grange and other agricultural associations. Since her husband's death in the autumn of 1901, Mrs. Foulke has continued the management of her own farm and in addition to that of other places in her vicinity.

H. R. FULTON. Born in Mississippi. After graduation from the University of Mississippi, taught in high school. Later carried on advanced study at University of Missouri and Harvard University. Formerly plant pathologist at the Louisiana Agricultural Experiment Stations. Since 1908, connected with the department of botany of the Pennsylvania State College and Agricultural Experiment Station. Specialty, crop diseases.

WILLIAM FREAR was born in 1860, in Reading, Pa. He was educated in the public schools of that city and of Norristown, entered the preparatory and later the collegiate department of Bucknell University, graduating in 1881; pursued a post-graduate course at Illinois, Wesleyan and Harvard Universities. Spent the growing season of the year during his childhood and youth at work upon a Pennsylvania farm; was made Assistant Chemist to the United States Department of Agriculture, 1883-5, and was engaged in sugar beet products and cereals. In 1885 he was elected professor of agricultural chemistry in the Pennsylvania State College, and in 1887 was made vice-director and chemist to the Pennsylvania State College Experiment Station. In 1888 he was elected chemist to the Pennsylvania Board of Agriculture, and in 1895 chemist to the Pennsylvania Department of Agriculture. He was also president of the National Association of Agricultural Chemists.

J. H. FUNK, M. D., 6th generation from Bishop Henry Funk, who emigrated from Holland in 1719, was born in Lower Providence, Montgomery county, Pa., was brought up on his father's large dairy farm; attended public schools in the winter. In 1859-1860 attended Freeland Seminary (now Ursinus College); began the study of medicine in the spring of 1863 and received his diploma as Doctor of Medicine from the University of Pennsylvania in the spring of 1865; opened the first drug store in Boyertown and run it several years in connection with the practice of medicine. Served several years as the Burgess of Boyertown, also as Town Councilor and eight years as School Director. Always being in love with horticultural pursuits, he planted a large orchard in 1879. In the year 1896, he planted another apple and peach orchard and has continued planting until he has about fifty acres of the most profitable orchards in the State. Such a thing as "off-year" bearing is unknown in these orchards. Was several years Pennsylvania State Pomologist. He wrote Bulletin No. 152, Fruits for Pennsylvania. He is now devoting his entire time to raising fruit on the best modern principles. In winter he has been for a number of years on the lecture force at Farmers' Institutes.

SHELDON W. FUNK was born in Boyertown, Berks county, Pa., May 7, 1899. He has a good high school education and also took a course at Perkiomen Seminary. From childhood he had been brought up among truck and fruit; five years of which were spent in Florida in the same vocation. For the last three years he has been in the greenhouse truck and fruit business with his father. Has had thirteen years' experience in the greenhouse, among the vegetable plants and the common flower.

PROFESSOR FRANK D. GARDNER, head of the Department of Agronomy of the Pennsylvania State College and Experiment Station was born and raised on a farm in Illinois and graduated from the College of Agriculture of the University of Illinois in 1891. For four years after graduation he was Assistant Agriculturist to his alma mater. He then served the National Department of Agriculture as Field and Laboratory Assistant, as Director of the Porto Rico Experiment Station and Chief of the Division of Soil Management. From the last named position he came to State College in his present capacity.

C. L. GOODLING was born in Loganville, York county, Pa. in 1885. He attended the public schools and York County Academy; entered the Pennsylvania State College 1903 and graduated 1907. After graduation was Assistant in the Dairy Husbandry Department, Pennsylvania State College, until December, 1909; since December, 1909, Superintendent of the Farms of the Pennsylvania State College, State College, Pa.

JOEL A. HERR was born in Clinton county, Pa., and educated in the public schools and at Dickinson Seminary. He served in the Civil War and has been a student, teacher and farmer all his life. He lives on his farm and gives special attention to fruit culture and stock raising. He is a member of the State Board of Agriculture.

GEORGE E. HULL, the subject of this sketch, a number of years ago moved upon a worn-out farm without buildings in Mercer county. By industry, perseverance and intelligent effort he has succeeded in restoring it to the highest state of fertility; has placed thereon substantial and convenient farm buildings, and educated his children, without other income than derived from the farm. His silos, stock scales, farm implements and improved live stock are the admiration of all progressive farmers.

EDWARD K. HIBSHMAN was born and raised on a tobacco farm near Ephrata, Lancaster county, Pa. After completing the course in the Ephrata schools, he entered the Pennsylvania State College and graduated from that institution in 1909, with the degree of B. S. in Agriculture. Since that time he has been employed by the Pennsylvania State College as Field Assistant to the Department of Experimental Agricultural Chemistry, and has been in charge of the field work of the tobacco experiments. In the spring of 1910 he was appointed a special Collaborator in the tobacco investigations of the Bureau of Plant Industry, Washington, D. C.

A. J. KAHLER was born in Hughestown, Pa., in 1834; was educated in the public schools and afterwards taught school in his native county; has always lived upon a farm, has filled every local office in his township, was a member of the Legislature in 1891-1892; was president for six years of the County Agricultural Society; is a member of the State Board of Agriculture, and has been identified with most of the leading farm organizations of the State.

HOMER W. JACKSON was born in Ohio; raised in town and knew nothing of farming until 21, when he moved with his parents to a farm in Guernsey county. He did some market gardening, fruit growing and general farming and kept developing his poultry and small fruits. For the last seven or eight years his time has been occupied mainly with investigation work in poultry, his farm being known as "The National Stockman and Farmer Poultry Experiment Farm." He took charge of the Division of Poultry at Pennsylvania State College and Agricultural Experiment Station. Was elected vice-president of the state branch of the American Poultry Association.

R. P. KESTER was born in Clearfield county, Pa., January 18, 1867. He now resides on the farm which his maternal great grandfather "took up" and partially cleared nearly 100 years ago. It was farmed for 80 years in the old way and the fertility was depleted until it was one of the worn-out farms. During the past few years Mr. Kester and his younger brother have been farming and dairying by modern methods, until now even five blades of grass grew where one grew before. Their leading business is dairying, although fruit, poultry and trucking receive attention. He was fifteen years a teacher and always a close student. And by learning from others and by experiments is making the homestead farm pay.

FRANK KLINE was born 1869 in Spring City, Chester county, Pa., of Pennsylvania born parents. Not being so fortunate as to be born and raised on a farm, having lived in a farming district he has been an observer of nature's works and while young took a great fancy to chickens and pigeons, which he has bred since twelve years of age. In 1895 he began to breed pure breed chickens both for utility and fancy. As a fancier he has exhibited in many

of the largest shows in the United States, winning hundreds of regular and special prizes. At present his specialty is R. C. Rhode Island Reds, which have been handled with success for several years with the early hatching and rearing of chicks for both market and winter egg producers a special feature. His breeding yards are about his home in Spring City, where the public who are interested in poultry culture are welcome at all times.

PROFESSOR CARL W. LARSON was born in Mitchell county, Iowa, May 29, 1881. He was educated in the public schools of St. Anagar. In 1889 he graduated from the St. Anagar Business College, returning the same year to his father's farm. He entered the Ohio State College in 1901. The first two years he devoted to a study of General Science, and followed this with three years general agriculture, graduating in 1906. During his course, much time was devoted to dairy work, and in 1907 he completed a post-graduate course at the same institution, specializing in Dairying. While in college he was an assistant in the dairy department. After leaving college he worked in a large co-operative creamery in Minnesota. He also made cheese in a Wisconsin factory. Last year he was appointed by the Agricultural Department at Washington as inspector of butter for the United States Navy. He now holds the position of Assistant Professor of Dairy Husbandry at the Pennsylvania State College.

L. W. LIGHTY was born in York county, Pa., 1857; attended the public schools of his neighborhood; afterwards attended a select school in Adams county and then taught school for seven winters. During this time he attended the York County Academy one term and also attended the State Normal School at Millersville. He then kept store, but not liking the business he got out of it and started in the poultry business, keeping both market and fancy poultry, and engaged in bee keeping and the culture of small fruits. In 1893 he purchased the farm upon which he now lives. The land was worn out and the building quite dilapidated. He has improved this until it is now one of the best farms in his county. He has a large library of standard books, keeps a selected dairy of cows, and has all the modern improvements needed to equip a first-class farm.

D. K. MURRAY, A. M., Ph. D., was born 41 years ago at Liverpool, Pa. His education was received in the public schools of the State. He graduated from the Lock Haven Normal School, also from Taylor University with the degree A.B. His post graduate work was done at University of Chicago. Dr. Murray taught in the public schools of the State for eight years. For eight years he lived in the west and while there co-operated with Pres. Chalmers of the Agricultural College of S. Dakota in a crusade of education among farmers, which has resulted in that State coming to the front not only in wheat but other cereals. Dr. Murray urged upon the farmer the necessity of soil conservation and the future of fruit culture. This he did while following his profession. He has always been actively interested in agricultural and horticultural pursuits. For nearly two years he has been working in the Department of Agriculture, Division of Zoology, giving all his time to this work. He has risen to the first rank as an intelligent and painstaking investigator. In his district his services are constantly in demand by granges and farmers' alliances.

W. H. McINTIRE was born in Wilmington, North Carolina. Graduated from the North Carolina Agricultural College, 1905. After graduation he was engaged in sanitary water analysis in the North Carolina Laboratory of Hygiene, from 1905 to 1907. Excepting a brief period devoted to commercial work during 1907, he has been employed at the Pennsylvania Experiment Station with Dr. H. P. Armsby in Nutrition work and in Department of Agronomy upon soil analysis. Degree of M. S. from Pennsylvania State College, 1909.

CLARENCE C. McCURDY was born in Crawford county, Pa., September 25, 1885. His received his early education in the high school of his home town. Successfully completing the correspondence courses in agriculture in the Pennsylvania State College, he then went to the Michigan Agricultural College, where he spent two years in taking a special course in general agriculture and poultry husbandry. After finishing the course there he spent the first year in superintending a poultry and truck farm near Pittsburg. Returning home where he is now giving special attention to poultry as a profitable side line on the farm and showing his ability to improve the fertility of the soil and grow better crops and more of them.

MALCOLM H. McCALLUM is a Berks countian by birth, born, however, of Scotch parentage, and "dyed deep in the wool" in truck and fruit raising, his father, James McCallum, being the pioneer celery and fruit grower for the Reading markets. He is in the prime of life. He was educated in the common schools of Berks county, Pa., Butler University, Indianapolis, Indiana, and the University of Pennsylvania, Philadelphia, Pa. In 1904 he was chosen farm and garden superintendent of State Asylum, Wernersville, Pa., which position he now holds.

THOMAS I. MAIRS spent his early life upon a stock farm and graduated from the College of Agriculture of the University of Missouri in 1896. He took graduate work at the Michigan Agricultural College, the University of Illinois, and the University of Missouri. He was superintendent of field experiments at the University of Illinois in 1896-7, and Assistant in Agriculture at the University of Missouri from 1897 to 1901. Since he has been connected with the Pennsylvania State College. He is now Superintendent of Correspondence Courses and Professor of Agricultural Education. He has taught dairy and animal husbandry and has had charge of the experiment work along these lines.

M. S. McDOWELL was born in Mifflin county, Pa., attended the public schools, and Lewistown Academy; entered Pennsylvania State College in 1888, and was graduated in 1892; after graduation was connected with a fertilizer manufacturing establishment in Baltimore, and later came to the Chemical Department of the Experiment Station, with which he has been connected for some years.

PROF. FRANKLIN MENGES, Ph. D., was born forty-six years ago at Menges Mill, York county, Pa.; the first nineteen years of his life were spent on his father's farm with all the ardour that farming meant in those days; he then began a course of preparation for college at the Baugher Academy, Hanover, Pa., and entered and graduated from Pennsylvania College, Gettysburg, with the class of 1886; was immediately tendered and accepted the position of assistant professor of chemistry in his Alma Mater, which position he held until 1896, when he came to York and took the professorship of the sciences in the York High School, which position he now holds; received the degree of Ph. D. from his Alma Mater for special work in chemistry, mineralogy and physics. He has for years been a student of the "Experiment Station Record," and has continued an interest in practical agriculture and has lectured before Farmers' Institutes.

MRS. GEO. E. MONROE graduated from Geneva, N. Y. State Normal School Classical Course. Taught two years in Dryden High School. Has lived in her present home, a farm of 60 acres, for the past twenty-five years. Before the College of Agriculture was founded at Cornell, she assisted Prof. W. W. Wing in carrying on poultry experiments. Since then she has regularly lectured to the poultry classes, being there for "Farmers' Week" also. For three years she was on the Poultry Institute staff with Prof. James E. Rice, conductor. She has twice been to Connecticut State Meetings and for several years has been Institute Lecturer in this State. Has bred and exhibited Single Comb Black Minorcas for 21 years exclusively; taking high premiums at Boston, New York, Newark, N. J., Atlantic City, Pan-American and St. Louis Expositions. Has also raised ducks and turkeys.

C. E. MYERS was born and raised on a farm in Lycoming county, Pennsylvania. His early education was received in the rural schools of that county and at the Lycoming County Normal School. Entered the Pennsylvania State College in 1904 and graduated from the course in Agriculture in 1908. During the summers of 1906 and 1907 was Special Field Assistant in the Division of Zoology, Department of Agriculture. Was appointed Assistant in Horticulture at the Pennsylvania State College July, 1908, and since that time his attention has been given to experimental work in vegetable gardening, except for a leave of absence during the college year of 1910-11, which was spent in graduate work in plant breeding at Cornell University.

HENRY W. NORTHUP was born on a farm in Abington, once considered the banner agricultural township in Luzerne county; he was educated in the public schools and at Madison Academy. His chief business is that of farmer and dairyman; has been greatly benefited in this line of business for the last ten years by being associated with some of the best and most practical agriculturists in this and adjoining states in the Institute work; has had some experience in fruit and market gardening and in disposition of these products in the city of Scranton, where an excellent market has been secured.

PROF. WM. G. OWENS, of Bucknell University, was born in Union county, received his early education in the public schools of Lewisburg, Pittsburg and Allegheny City. Entered Bucknell University in 1876; was graduated 1880; took his A. M. in 1883; taught in Bucknell University five years after graduation. In 1885 he became instructor in natural sciences. Took special work at Harvard and Berlin, Germany. In 1887 became professor of chemistry and physics, the position which he now holds. Has spent almost all his vacations on a farm and thus kept in close touch with nature.

J. H. PEACHEY was born in Mifflin county, Pa., in 1852; his early life was spent on the farm which he now owns; received his early education in the public schools; taught school for a number of terms in Pennsylvania and Ohio; graduated in the scientific course from the Ohio Normal University of Ada in 1881. Continued teaching until driven from the school room because of ill health; he began farming in 1887. Following general farming for a few years, he began specializing in the dairy-making butter for a special trade; and growing hogs. Disposing of his dairy a few years ago his attention is directed toward the growing of the peach and apple. He is deeply interested in the new agriculture, believing that clear thinking and right living will elevate the farmer.

DR. W. T. PHILLIPY was born on his father's farm in Antrim township, near Greencastle, Franklin county, Pa., February 25, 1863. Received his early education in the public schools and Zeyler's Academy at Greencastle, Pa., during summer season worked on the farm. March 28, 1884, received degree of M. D. from Jefferson Medical College, Philadelphia; came to Cumberland county, and practiced medicine successfully until about 1902, when he purchased a worn out farm near Carlisle, Pa., and proceeded to use modern and scientific methods and soon made it one of the best producing farms in that community; and since has bought another farm near and is now supervising the two farms and giving his time to scientific and practical farming in all its branches, including stock raising. He has filled a number of positions of trust and is a student of agriculture and keeps abreast of the best methods for successful tilling the soil.

THOMAS J. PHILIPS was born upon a farm in Chester county, Pa., December 1846; attended public and private schools and graduated from Bucknell University in 1867; spent three years in manufacturing iron, and traveling, and then settled upon the farm where he still lives, giving special attention to dairying and raising dairy stock, but devoting much of the 200 acre farm to the production of mixed crops, suitable to that locality and market. That he had been a success is attested by the fact that he has been a director in a national bank for many years, a manager in one of the largest fire insurance companies in the state, and of building and loan association; served two years in the State Legislature, as a representative of the farming interests; he has contributed acceptably from time to time of his experience to the agricultural press, and in every way has kept in the front among the most progressive of his locality, believing in higher education, attractive country homes, and that success is the result of individual effort and judgment.

E. L. PHILLIPS was born on his father's farm in Clarion county, Pa. Was educated in the common schools and a course in the High School at Reid Institute, Pa. Since then he has studied extensively in agriculture. Was married in 1885, after which he devoted his time to agriculture, owning and operating his 200 acre farm with profit to himself. Said farm is in Clarion county, Pa. He has devoted his farm chiefly to the production of fruits, live stock and grain suitable to that location and market. He has been an experimenter with various plant foods. His real estate holdings and commercial standing are a strong recommendation to himself and to the farm,

WARREN G. ROSS was born at Dunkard, Greene county, Pa., November 22, 1883. Early life spent on the farm; prepared for college at the West Virginia University Preparatory School, 1900-1904. Extended the course in agriculture at the Pennsylvania State College, February, 1905, graduated June, 1908. Was instructor in Agronomy at College Hawaii, Honolulu, 1908-1909. At present he is assistant in Agronomy at the Pennsylvania State College. Summer of 1910 engaged in field work for Bureau of Soils.

R. S. SEEDS was born in Huntingdon county, Pa., in 1852; was educated in the public schools and at the Shade Gap Academy. He was raised upon a farm and traveled for eighteen years among the farmers selling agricultural implements. In 1892 he bought a farm that had been run down, which he has greatly improved.

A. W. STEPHENS was born in Westmoreland county, Pa., and received college training in this State, after which he went to Cornell University and was graduated from there in agriculture in 1900. For eight years he managed

a successful co-operative store and while at Cornell made a special study of co-operation among fruit growers. He was orchard instructor for the Division of Zoology.

W. H. STOUT was born October 18, 1840, in Lower Nazareth township, Northampton county, Pa.; was educated in the common schools and engaged in various occupations, serving an apprenticeship at coopering and milling, at clerkship and traveling salesman; has lived on his present farm for the past twenty-eight years, and is engaged in general farming, trucking, fruit growing and bee-keeping; has acquired practical and scientific information by observation and study; speaks English and German.

CHARLES H. RICH. Born at Woolrich, Pa., December 31, 1862. Earlier life spent in Woolrich, employed in the woolen mills and on the farm. Educated in the common and high schools of the township, Pierce's School, Philadelphia, Pa., and Allegheny College at Meadville, Pa., followed surveying and lumbering for a number of years; also owner and operating a flouring mill in connection with several farms; a student of Chemistry and Physics as applied to agriculture. Is a member of the Farmers National Congress; Director of Continental Condensed Milk Co., Mill Hall, Pa., vice president of Mill Hall State Bank; Director in several utilities companies; lecturer in the grange; advocate of good schools, good roads and scientific farming. Has traveled much and taken an active part in horticulture and dairying—a model orchard is on his farm, has been a lecturer in Farmers Institutes in Pennsylvania and Ohio.

B. O. SEVERSON was born near Stoughton, Wisconsin, December 9, 1887. His parents are of Norwegian descent and are living at Stoughton, Wisconsin. His early life was that of a farm boy, receiving his early education at a district school, from which he graduated. Later, his education was continued at Stoughton High School. After graduating in the spring of 1906, he entered the University of Wisconsin, graduating there from the Agricultural course in 1910. During his University course, his specialty was along animal husbandry lines. During the past year, has been engaged as an instructor with the animal husbandry department at the Pennsylvania State College.

CHAS. F. SHAW was born in West Henrietta, N. Y., on May 2, 1881, attended the local district high schools; prepared for college at Starky Seminary Lakemont, N. Y., entering Cornell University in 1902. He graduated from the College of Agriculture in 1906, and took up work as Scientist in Soil Survey in the Bureau of Soils, working in Louisiana, Arkansas, Texas and Pennsylvania. In 1907 he spent three months at Pennsylvania State College as instructor in Agronomy and in the fall of that year began regular teaching work in that institution. He is now Asst. Professor of Agronomy, teaching soils and fertilizers. During the Summer he is engaged in the work of the U. S. Bureau of Soils making a soil survey of the State of Pennsylvania.

MISS SARA PHILLIPS THOMAS graduated from Friends Central School, Fifteenth and Race streets, Philadelphia, and since then has attended many lectures, some on Domestic Science and kindred subjects. Her especial interest in institute work at which she has been engaged for several years is in the establishment of Ladies' Sessions where the interests of the household can be discussed along practical lines. She was born on a farm in Chester Valley near Wayne, where she resided until recently and has been a practical housekeeper, giving much thought and considerable study to this department of the home. At present she is actively engaged in educational work.

LEON OTICE VAN NOY was born in Troy, Pa., 1876, on a dairy farm. At the age of six years his father started in the pure blood cattle. Was educated in the public school, Troy High School and took special work in general agriculture and dairy farming for three years at the Pennsylvania State College. He returned and went into partnership with his father in the dairy business and made a number of experiments in feeding for profit. In the fall of 1900, he was forced to quit his father's farm on account of ill health and traveled for a few years. Was in and through 34 states. During this time he worked at a number of occupations besides farming. Had a great opportunity to compare city life with country life. In 1906 he returned to his father's farm and took the management of it. Has a private creamery and at the present time is trying to solve the problem of the direct route from the producer to consumer.

PROF. H. E. VAN NORMAN is a native of Ontario, Canada, and is now 36 years of age. He grew up on farms in Nebraska, Illinois and Michigan, and early became acquainted with pure bred livestock through his father's association with a large importer and exhibitor of Holstein cattle and English draft horses, and by attendance at the old Chicago Fat Stock Show. Was

appointed farm superintendent at Purdue University Agricultural Experiment Station, Lafayette, Ind.; after four years in this work he was appointed professor of Dairy Husbandry, Pennsylvania State College of Agriculture, which position he now holds.

- R. J. WELD was born in Warren county, Pennsylvania, October 27, 1868 upon the farm which he now owns and operates. He is of Scotch-American parentage. His education was secured at the common schools and at the Sugar Grove Seminary, also at a business college. He received his agricultural education and training at the Pennsylvania State College and Experiment Station. He is actively engaged in dairy farming and endeavoring through breeding, weeding and feeding to build up a large herd. He keeps accurate records of the production of his cows, and is building up his farm through systematic cultivation and fertilization.
- C. B. WADE was born at Orangeville, Ohio, August 15, 1881, on one of the best farms on the Western Reserve; was educated in the public schools of Orangeville, Hartford High School and New Syme Institute; after which he assisted his father for five years in the work on the home farm of 350 acres, which was largely devoted to the production of beef cattle. He then married and removed to Columbia, Mo., where he assumed the management of one of the largest and most successful dairies in the West, at the same time taking the course in agriculture at Missouri State University. In 1907 he returned to Ohio and purchased a farm adjoining the home farm, where he now resides; also operating a farm in Mercer county, Pa.
- W. THEO. WITTMAN was born and raised on a farm in Lehigh county. Beginning there as a small boy he was particularly interested in poultry and fruit growing and has always since retained a strong interest in both these branches of agriculture. He spent a number of years as a newspaper man, constantly studying and working with both the poultry and fruit. His poultry has always been a success; either in the beginning in a small and a large way as a utility adjunct or later, when as a breeder of a popular variety of poultry, he stood supreme in this country and the fame of his particular line has reached around the world. Besides the above he is a poultry judge, with a national reputation, and his name is constantly appearing in the better class of poultry journals as a contributor to the poultry knowledge of the day. He has written several books on poultry keeping that are largely advertised and have commanded a big sale. As Superintendent Manager of the Poultry Department of the Lehigh County Agricultural Society for their Fair at Allentown, he has built up there one of the very finest and best displays of pure bred poultry to be seen anywhere in this country, greatly stimulating the interest in better poultry among farmers and others throughout eastern Pennsylvania and thereby enhancing the market value of their poultry and poultry products enormously.
- D. H. WATTS was born near Kerrmoor, Pa., May 25, 1861; was raised on the farm of his father, Martin Watts, and educated in the public schools, which schooling was supplemented by a few months attendance at the Indiana State Normal School. He always has been interested in farmer's organizations and served two years as President of the Clearfield County Agricultural Society. He located upon his farm in 1866 and erected thereon modern buildings and established a dairy plant, where fine butter for a special trade is produced. The growing of fruits is also a specialty. On his farm known as "Orchard View Farm," there are 3,000 apple, peach, pear and plum trees, all his own selection and planting.
- S. PAUL WOODMAN was born on a farm near Rushland, Bucks county, Pa., where he has always lived. He was educated at a common public school, took a three years course at the George School, near Newtown, Pa. Upon leaving the George School in 1898 he went to work on his father's farm for wages, where he worked until he took entire charge of the farm in 1905. At that time he was taking a correspondence course in agriculture at State College, Pa. He is engaged in general farming, fruit growing and market gardening.
- MRS. SARAH BARTRUFF FRITZ ZEIGLER was born near Manheim, Lancaster county, Pa. Later moved with her parents to Perry county. Was educated in the public schools, New Bloomfield Academy and Juniata Valley Normal School. Previous to her marriage she taught school six winters. From 1890 to 1902 she manufactured and sold large quantities of jelly to the New York, Philadelphia and Boston markets. Was an active member of Prospect Grange and always held an office in the organization. She has always been deeply interested in agricultural pursuits and since her husband's death has conducted her farm of 140 acres in an able manner, bringing it up to a high standard of production and adding improvements, believing that pleasant surroundings tend to a better and happier home life.

Directions: County Chairmen and Local Institute Committees will please use the following outline for heading of program and follow as far as practicable the classification of subjects embracing no more than two distinct topics for one session. The address of Welcome and Response can be omitted and a brief introductory address by County Chairmen substituted when Local Committee deem advisable.

SAMPLE PROGRAM—This Sample is Designed as an Aid to Institute Managers in Making up Their Programs.

PROGRAM

OF THE

.....COUNTY

FARMERS' INSTITUTE

TO BE HELD UNDER THE AUSPICES OF

DEPARTMENT OF AGRICULTURE
OF PENNSYLVANIA

DIVISION OF FARMERS' INSTITUTES



IN.....HALL

.....PA.

FRIDAY AND SATURDAY, DEC. 5 and 6, 1912

EXERCISES PUBLIC AND FREE--EVERYBODY IS INVITED

ORDER OF BUSINESS

OPENING SESSION.

Devoted to Soil Conditions.

Wednesday Afternoon, December 3, 1:30.

Presiding Officer, ...

Opening Exercises.

Soil Fertility.

Soil Cultivation.

How to Conserve Soil Moisture.

(Question Box.)

Adjournment.

EDUCATIONAL SESSION.

Wednesday Evening, December 3, 7:00.

Nature Study for County Schools.

Essential Qualifications to Successful Teaching.

Attractive Country School Grounds.

The Central Township School.

Adjournment.

DAIRY, STOCK AND POULTRY SESSION.

Thursday Morning, December 4, 9:00.

(Question Box.)

Feed for the Dairy Cow.

The Silo As An Economic Investment in the Dairy.

Poultry Breeding and Feeding for Profit.

Adjournment.

Thursday Afternoon, December 4, 1:30.

(Question Box.)

Good Country Roads; How Obtained.

Sheep Husbandry.

Legumes for Feed and Fertility.

Adjournment.

LADIES' SESSION.

In the Interest of Country Homes.

Thursday Evening, December 4, 7:00.

Music.

A Model Home.

What Books and Magazines Shall We Read; The Quality and Preparation of Food.

Heating, Lighting, Ventilating and Sanitary Arrangement of Country Homes.

Lawn and Garden.

Social Life in Rural Districts.

Adjournment.

SPECIAL NOTICE.

The foregoing order will be followed as closely as possible, but other exercises will be introduced, if found desirable.

Although these institutes are designed and conducted for the education and advantage of farmers, yet all who are interested are invited to attend, and it is hoped that they will show their appreciation, not only by being present at the meetings, but also by taking part in the discussions.

ASK QUESTIONS.

A question box will be kept upon the secretary's desk, and all are invited to place therein such questions as they may wish to have discussed during the session. At the proper time, designated by the meeting, these questions will be referred to some one for answer, or brought up for general discussion.

All granges, alliances, agricultural societies and kindred agricultural organizations are specially invited to attend.

For further information, and for programs, address,

Name, ...

Address, ...

Chairman of the Board of Institute Managers for _____ County.

Local Committee.	Committee on Question.	County Board of Managers.
Wm. Stevens, Address, ...	William Stover, Address, ...	J. A. Walker, Address, ...
Mrs. Jane Welly, Address, ...	Miss Jane Miller, Address, ...	Wm. Cedars, Address, ...
Miss Emma Stone, Address, ...		John Williams, Address, ...

MEANS OF ACCESS.

Trains on the B. C. R. R. arrive from the East at 8:30 A. M. and 5:19 P. M.; from the West at 9:40 A. M. and 9:38 P. M.

On the P. R. R. trains from the East arrive at 4:52 and 9:54 A. M. and 4:32 P. M.; from the West at 10:18 A. M. and 5:08 and 9:23 P. M.

CALENDAR, 1912.

JANUARY.

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Commonwealth of Pennsylvania.

DEPARTMENT OF AGRICULTURE

BULLETIN No. 215

LIST OF PUBLICATIONS IMPORTANT TO FRUIT GROWERS

PREPARED BY

DOCTOR J. P. STEWART, Experimental Pomologist,
PENNSYLVANIA AGRICULTURAL EXPERIMENT STATION,
STATE COLLEGE, PA.

Published by direction of the Secretary of Agriculture



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PREFACE

The people who are most likely to succeed in any line of activity, are not those who think they know every thing that needs to be known about the business in which they are engaged, but, rather those who recognize their need of information and who know how and where to secure it.

There is no branch of Agriculture that requires a wider range of knowledge than fruit growing, and in order to assist fruit growers in securing the information so necessary to their success, this Bulletin, containing a list of Agricultural publications, giving information upon the various phases of the subject, is published.

The list was prepared by Doctor J. P. Stewart, Experimental Pomologist of the Pennsylvania Agricultural Experiment Station, whose work is such as to impress him with its importance to fruit growers, and the Department is glad to give to it the publicity it merits, and send it forth on its mission of helpfulness to the many fruit growers of the State.

A handwritten signature in cursive script, reading "A. B. Britchfield". The signature is written in dark ink and is positioned above the printed title.

Secretary of Agriculture.



A REFERENCE LIST ON FRUIT GROWING

(By J. P. Stewart, Ph. D., Experimental Pomologist, Pennsylvania Agricultural Experiment Station, State Collège, Pa.)

INTRODUCTORY

This list is prepared largely to meet the needs of those actively engaged in fruit-growing, or about to engage in it, who desire to know more of the best present-day methods and of the means for keeping in touch with advances as they are made. The list also contains some references of a more technical character, that may be of value to the investigator. It is based largely upon recent publications of various Agricultural Experiment Stations and of the Department of Agriculture at Washington, which are obtainable on request, so far as available. These publications are usually concise and up-to-date, and in many cases they may contain all that is needed by the grower.

Some valuable material, however, is only available in certain publications offered for sale. These include (1) books, (2) periodicals, (3) reports of horticultural organizations, and (4) certain bulletins put out by the U. S. Department of Agriculture. Such publications are starred (*) in the following list, and the books are further distinguished by enclosing their titles in quotation marks. A number of the references contain lists of their own. This is notably true of No. 7 in our Section I, its cost being 20 cents, and its method of purchase is given in Circular 3 of the Division of Publications mentioned below.

The following lists are obtainable, on request, from the Secretary of Agriculture, Washington, D. C.:

- (1.) List of Publications of the Department of Agriculture available for Free Distribution. Circular 2, Division of Publications.
- (2.) List of Publications of Department of Agriculture for Sale. Circular 3, Division of Publications.
- (3.) Enrollment on mailing list to receive:
 - (a) Monthly List of Publications.
 - (b) List of Station Publications received at the office of Experiment Stations.

For those desiring additional and fuller information on agricultural and kindred publications throughout the world, with brief abstracts of the more valuable articles, the Experiment Station Record is available. It is now issued in two volumes a year, 8 numbers each,

at \$1.00 per volume, payable in advance to the Superintendent of Documents, Government Printing Office, Washington, D. C.

The various divisions of the U. S. Department of Agriculture are as follows:

U. S. DEPARTMENT OF AGRICULTURE, WASHINGTON, D. C.

Scientific Bureaus.

Weather Bureau—Willis L. Moore, Chief.
 Bureau of Animal Industry—A. D. Melvin, Chief.
 Bureau of Plant Industry—B. T. Galloway, Chief.
 Forest Service—H. S. Graves, Forester.
 Bureau of Soils—Milton Whitney, Chief.
 Bureau of Chemistry—H. W. Wiley, Chemist.
 Bureau of Statistics—V. H. Olmsted, Statistician.
 Bureau of Entomology—L. O. Howard, Entomologist.
 Bureau of Biological Survey—H. W. Henshaw, Chief.
 Office of Public Roads—L. W. Page, Director.
 Office of Experiment Stations*—A. C. True, Director.

Their *free* publications are obtainable on request from the Secretary of Agriculture, Washington, D. C.; and those for sale are obtainable from the Superintendent of Documents, at prices indicated in Circular 3, mentioned above.

The addresses of the various Experiment Stations and their Directors are as follows:

AGRICULTURAL EXPERIMENT STATIONS.

Alabama—

College Station: Auburn; J. F. Duggar, a
 Canebrake Station: Uniontown; F. D. Stevens, a
 Tuskegee Station: Tuskegee Institute; G. W. Caryer, a

Alaska—

Sitka: C. C. Georgeson, b

Arizona—

Tuscon: R. H. Forbes, a

Arkansas—Fayetteville: C. F. Adams, a
 California—Berkeley: E. J. Wickson, a
 Colorado—Fort Collins: C. P. Gillette, a
 Connecticut—

State Station: New Haven: E. H. Jenkins, a

Storrs Station: Storrs; L. A. Clinton, a

Delaware—Newark: H. Hayward, a

Florida—Gainesville; P. H. Rolfs, a

Georgia—Experiment: Martin V. Calvin, a

Guam—Island of Guam: J. B. Thompson, b

Hawaii—

Federal Station: Honolulu; E. V. Wilcox, b

Sugar Planters' Station: Honolulu; C. F. Eckert, a

Idaho—Moscow: W. L. Carlyle, a

Illinois—Urbana: E. Davenport, a

Indiana—La Fayette: A. Goss, a

Iowa—Ames: C. F. Curtiss, a

Kansas—Manhattan: E. H. Webster, a

Kentucky—Lexington: M. A. Scovell, a

Louisiana—

State Station: Baton Rouge; W. R. Dodson, a

Sugar Station: Audubon Park, New Orleans; W. R. Dodson, a

North Louisiana Station: Calhoun; W. R. Dodson, a

Maine—Orono: C. D. Woods, a

Maryland—College Park: H. J. Patterson, a

Massachusetts—Amherst: W. P. Brooks, a

Michigan—East Lansing: R. S. Shaw, a

Minnesota—University Farm: St. Paul; A. F. Woods, a

Mississippi—Agricultural College: J. W. Fox, a

Missouri—

College Station: Columbia; F. B. Mumford, a

Fruit Station: Mountain Grove; Paul Evans, a

Montana—Bozeman: F. B. Linfield, a

Nebraska—Lincoln: E. A. Burnett, a

Nevada—Reno: J. E. Stubbs, a

New Hampshire—Durham: J. C. Kendall, a

New Jersey—New Brunswick: J. G. Lipman, c

New Mexico—Agricultural College: Luther Foster, a

New York—

State Station: Geneva; W. H. Jordan, a

Cornell Station: Ithaca; L. H. Bailey, a

North Carolina—

College Station: West Raleigh; C. B. Williams, a

State Station: Raleigh; B. W. Kilgore, a

North Dakota—Agricultural College: J. H. Worst, a

Ohio—Wooster: C. E. Thorne, a

Oklahoma—Stillwater: J. A. Wilson, a

Oregon—Corvallis: J. Withycombe, a

Pennsylvania—

State College: Thomas F. Hunt, a

State College: Institute of Animal Nutrition; H. P. Armsby, a

Porto Rico—

Federal Station: Mayaguez; D. W. May, b

Sugar Planters' Station: Rio Piedras; J. T. Crawley, a

Rhode Island—Kinston: H. J. Wheeler, a

South Carolina—Clemson College: J. N. Harper.

South Dakota—Brookings: J. W. Wilson, a

Tennessee—Knoxville: H. A. Morgan, a

Texas—College Station: H. H. Harrington, a

Utah—Logan: E. D. Ball, a

Vermont—Burlington: J. L. Hills, a

Virginia—

Blacksburg: S. W. Fletcher, a

Norfolk: Truck Station; T. C. Johnson, a

Washington—Pullman: R. W. Thatcher, a**West Virginia—Morgantown:** E. D. Sanderson, a**Wisconsin—Madison:** H. L. Russell, a**Wyoming—Laramie:** H. G. Knight, a

a. Director.

b. Special Agent in charge.

c. Acting Director.

Their publications may be obtained, so far as available, by writing the Directors or Stations direct, or by writing the author of the desired publication at the Station address.

The reports of horticultural and other organizations referred to in the following list are obtainable at moderate cost, so far as available, from the sources indicated below:

- (1) Society for Horticultural Science,
Secretary, C. P. Close, College Park, Md.
- (2) American Pomological Society,
Secretary, John Craig, Ithaca, N. Y.
- (3) Pennsylvania State Horticultural Association,
Secretary, C. J. Tyson, Floradale, Pa.
- (4) Western New York Horticultural Society,
Secretary, John Hall, Granite Building, Rochester, N. Y.
- (5) New York State Fruit Growers Association,
Secretary, E. C. Gillett, Penn Yan, N. Y.
- (6) Woburn Experimental Farm,
(Reports obtainable from "The Amalgamated Press, Ltd." Carmelite
St., London, England.)
- (7) Pennsylvania State Department of Agriculture, Harrisburg, Pa.
- (7 a) Adams County Fruit Growers Association. Secretary, C. J. Tyson,
Floradale, Pa.
- (8) Ontario Department of Agriculture, Guelph, Ontario.
- (9) Canada Central Experimental Farms, Ottawa, Canada.

The more important periodicals relating to fruit, wholly or in part, are as follows:

- (1) Better Fruit. Hood River, Oregon.
- (2) The National Nurseryman, Rochester, N. Y.
- (3) The Western Fruit Grower, St. Joseph, Mo.
- (4) The Canadian Horticulturist, Peterboro, Ontario.
- (5) Colorado Fruit Grower, Grand Junction, Colorado.
- (6) The Fruit Magazine, Vancouver, B. C.
- (7) The Rural New Yorker, New York, N. Y.
- (8) The American Agriculturist, New York, N. Y.
- (9) The Americulturist, Fowler, Indiana.

The "American Garden" and the "Western New York Apple" are referred to in the list below, but are no longer published, the articles in question being found only in certain libraries.

The books referred to below have the publishers indicated briefly in connection with the reference. The full titles and addresses of these publishers are as follows:

- (1) University Cooperative Association, Madison, Wis.
- (2) The Macmillan Co., 64-66 Fifth Ave., New York, N. Y.
- (3) Orange Judd Co., 439 Lafayette St., New York, N. Y.
- (4) Ginn & Co., 70 Fifth Ave., New York, N. Y.
- (5) J. B. Lippincott Co., Philadelphia, Pa.
- (6) Doubleday, Page & Co., New York, N. Y.

These lists are not intended to be complete in any case. Many articles were omitted purposely to avoid confusion or because of difficult availability of the reference. The articles that have seemed to the writer most important, however, have been included; and in most cases there are enough references given to permit of considerable choice and to provide against failure in obtaining any particular article.

I. STARTING APPLE ORCHARDS

LOCATION, VARIETY, SELECTION AND PURCHASE OF STOCK.

1. The Apple in Pennsylvania: Varieties, planting and general care. Stewart. Pennsylvania Station Bulletin. 106: 3-20. 1910.
2. Summer Apples in the Middle Atlantic States. Gould. U. S. 2 (a). Orchard Practice. Green. Ohio Station Cir. 108: 1-8. 1911.
- Bureau of Plant Industry. Bulletin 194: 7-53. 1911.
3. Connecticut (Storrs) Station Bulletin 62: 97-108. 1910.
4. Establishing the Apple Orchard. Erwin & Bliss. Iowa Extension Bulletin 5: 4-27. 1910.
5. Goff's "Lessons in Fruit Growing."* pp. 3-13. 1902. (University Cooperative Association, Madison, Wis).
6. Bailey's "Principles of Fruit Growing."* pp. 37-61. 1897. (The Macmillan Co., 64-66 Fifth Ave., New York, N. Y.)
7. Office of Experiment Station Bulletin 178,* pp. 14-17. 1907.
8. Suggestions on planting Orchards. White. Michigan Bulletin 262: 5-29. 1910.
9. Fruits Recommended by the American Pomological Society for Various Sections. Ragan. U. S. Bureau of Plant Industry Bulletin 151:* 5-69. 1909.
- 9 (a). The Ben Davis Group of Apples. Shaw. Mass. Sta. Rpt. 1910, pp. 176-193.
- 9 (b). Variation in Apples. (Technical). Shaw. Mass. Sta. Rpt. 1910, pp. 194-213.
- 9 (c). Blowing Stumps with Dynamite. Roberts. Kentucky Sta. Bul. 154: 19-30. 1911.

VARIETAL ADAPTATIONS TO SOILS.

10. Wilder. American Pomological Society Report* for 1909, pp. 138-143.
11. Wilder. Pennsylvania Horticultural Association Report* for 1908, pp. 55-57.
12. Bonsteel. Office of Experiment Station Bul.* 178: 14-16. 1907.
- 12 (a). Wilder. Annual Report. Penn. Expt. Station, 1910-11.

PREPARATION OF SOIL, PLANTING SYSTEMS AND PLANTING.

13. Planting the Apple Orchard. Jarvis. Connecticut (Storrs) Station Bulletin 62: 109-133. 1910.
14. Planting the Commercial Orchard. Moore. Wisconsin Bul. 201: 2-34. 1911.
15. Bailey's "Principles in Fruit Growing"*, pp. 237-276. 1897.
16. Planting Systems, Craig, Western New York Horticultural Society Report.* 1910, pp. 67-73.
17. Starting Apple Orchards. Munson, W. Virginia Bul. 116: 213-248. 1908.
18. Apple Planting in Idaho. Judson. Idaho Bul. 43: 321-351. 1904.
19. Apple Planting in Idaho. Shinn. Idaho Bul, 64: 3-37. 1908.
20. Value of Different Planting Distances, N. Y. Cornell Bul. 262: 311-312. 1909; and also Cornell Bulletins 226 and 229. 1905.

GENERAL CULTURE.

21. Growing the Apple Orchard. Alwood, Virginia Bulletin 99: 53-79. 1899.
22. Apple Culture. Macoun. Central Experimental Farm (Canada), Bulletin 37: 7-74. 1901.
23. Apple Culture. Hutt. Ontario Department of Agriculture. Bulletin 144: 2-37. 1905.

INTERCROPS.

24. (a) Bailey's "Principles of Fruit Growing."* pp. 170-172. 1897.
- (b) Interplanting. Jarvis. Connecticut (Storrs) Station Bulletin 62: 135-137. 1910.
- (c) Pennsylvania Dept. of Agr. Report,* 1908. Roberts. pp. 502-4.
25. (a) Intercropping (and note on planting hillside orchards), Stewart. Pennsylvania State Horticultural Association Report.* 1908. pp. 48-50.
- (b) Intercropping of Young Orchards. Watts. Report* for 1909 of the Fruit Growers' Association, Adams County, Pa., pp. 53-61.

II. CULTURAL METHODS AND COVERCROPPING.

1. Cultivation and Covercrops. Green, S. B. Office of Experiment Stations Bul.* 178: 19-23. 1907.
2. Control of Moisture in Orchard Soils. Shutt. American Pomological Society Report.* 1909: 32-41.

TILLAGE: METHODS, IMPLEMENTS AND PURPOSES.

3. Principles and Practice of Earth Mulches. King. Rural New Yorker,* July 2, 1910, pp. 689-90.
4. Cultivation of Orchards. Bailey. New York Cornell Bul. 72: 299-314. 1894.
5. Bailey's "Principles of Fruit Growing"* pp. 133-174. 1897.
6. N. Y. Cornell Reading-Course for Farmers. Craig. Ser. III. No. 3, 1903.

MULCHING.

7. Mulching. U. S. Department of Agriculture Farmers' Bul. 202: 8-12. 1904.
8. Grass Mulch. Vergon, F. P. Rural New Yorker,* No. 2874, 1905, pp. 137-38.
9. Collingwood. Rural New Yorker,* Oct. 23, 1909: p. 921; Oct. 30, 1909, p. 941.
10. The Apple in Pennsylvania. Stewart. Pennsylvania Station Bul. 106: 3-20. 1910.

GENERAL ORCHARD MANAGEMENT.

11. Orchard Management. Jarvis. Connecticut (Storrs) Station Bulletin 66: 217-263. 1911.
12. Management of a Bearing Orchard. Moore. Wisconsin Bul. 207: 2-34. 1911.
- 12 (a). Cost of Growing New York Apples. Burritt. R. New Yorker, 1911, pp. 733, 734.

EXPERIMENTS ON RELATIVE VALUE OF DIFFERENT METHODS.

13. Experiments in Orchard Culture. Emerson. Nebraska Bul. 79: 3-33. 1903. (Abstract) in U. S. Department of Agriculture Farmers' Bul. 202: 16-17. 1904.
14. Orchard Culture. Green, W. J. and Ballou. Ohio Bul. 171: 189-216. 1906. (Brief Abstract in U. S. Department of Agriculture Farmers' Bul. 267: 23-25. 1906.)

15. A Comparison of Tillage and Sod Mulch in an Apple Orchard. Hedrick. N. Y. Geneva Bul. 314: 77-132. 1909. (Abstract by Hall in popular edition of Bul. 314).

16. Experiments with Cultural Methods. Stewart. Pennsylvania Station Bul. 100: 17-28. 1910.

17. Tillage vs. Sod Mulch in Apple Orchards. U. S. Department of Agriculture Farmers' Bul. 419: 5-10. 1910. (A brief general review of Nos. 9 and 12 above).

18. Cultural Methods for Orchards. Burrill & Blair. Illinois Bul. 52: 105-127. 1898.

19. Effect of Grass on Trees. Bedford & Pickering. Woburn Experimental Fruit Farm Report,* 1903; also Journal* of Agriculture Science (England), 1908, pp. 411-434; and Nature* (London), 1907, No. 1962, pp. 126-127.

20. Orchard Survey of Niagara County. Cummings. N. Y. Cornell Bul. 262: 295-300. 1909; also compare Cornell Bulletins 226 and 229. 1905.

21. (a). An Apple Orchard Survey of Ontario County. Miss H. M. Martin. Cornell Bul. 307: 169-215. 1911.

III. ORCHARD COVER CROPS AND IRRIGATION.

A. COVER CROPS.

GENERAL CONSIDERATIONS.

1. Craig. In "Cyclopedia of American Horticulture,"* Vol. I, p. 388. 1905. (Doubleday, Page & Co.)

2. Summary of experimental work on cover crops up to 1903. Smith, C. B. Office of Experiment Stations Report, 1903: 555-558.

3. Orchard Cover Crops in Delaware. Close. Delaware Bul. 61: 3-32. 1903.

4. Relation of Plants in the Orchard. Hedrick. Proceedings* of the Society for Horticultural Science for 1903-4, pp. 72-82.

5. Orchard Cover crops. Thornber. Washington Station Bul. 8: 1-4. 1908.

IN RELATION TO WINTER INJURY.

6. Cover crops for young orchards. Emerson. Nebr. Bul. 92: 3-23. 1906.

7. Cover Crops. Sandsten. Wisconsin Report 1904, pp. 252-57.

8. Orchard Cover Crops. Craig. N. Y. Cornell Bul. 198: 97-133. 1902.

9. A side light on cover crops. Hedrick. Rural New Yorker, Vol. 43 (1904), No. 2862, p. 858.

VALUE AS MANURES.

10. Hopkins' "Soil Fertility and Permanent Agriculture,"* pp. 207-225. 1910. (Ginn & Co.)
11. Cover crops as green manure. Penny. Delaware Bul. 60: 3-44. 1903.
12. Natural Agencies in Soil Improvement. Voorhees. Pennsylvania State Dept. Agricultural Report for 1907, pp. 172-81. (General value of cover crops.)

GENERAL CULTURE OF CERTAIN CROPS.

13. (a) The Clovers. Hunt. "Forage and Fiber crops,"* pp. 140-173. 1907 (Orange Judd Co.) .
- (b) The Clovers. Voorhees. "Forage Crops,"* pp. 221-252. 1907. (Macmillan Co.)
14. (a) Cowpeas, soy beans, vetches, etc., Voorhees. "Forage Crops,"* pp. 253-274.
- (b) Cowpeas, soy beans, vetches, etc. Hunt, "Forage and Fiber Crops,"* pp. 241-274.
15. Crimson Clover culture. Grantham. Delaware Bul. 89: 3-36. 1910.
16. The Soy Bean; History, Varieties and Field Studies. Piper & Morse. U. S. Bureau of Plant Industry. Bul. 197: 9-31. 1910*.
17. Orchard Green-manure Crops in California. McKee. U. S. Bureau of Plant Industry Bul. 190: 7-40. 1910.*

B. IRRIGATION.

1. Importance of water. King, "Irrigation and Drainage,"* pp. 1-46. 1907. (Macmillan Co.)
2. Conditions which make irrigation desirable or otherwise. King's "Irrigation and Drainage,"* pp. 91-116. 1907.
3. Increase in yield due to irrigation in humid climates. King's "Irrigation and Drainage,"* pp. 171-195. 1907.
4. Review of irrigation investigations for 1903. Mead. Office of Experiment Stations Report for 1903, pp. 469-71; 483-87; in Italy, 493-96.
5. Experiment in orchard irrigation. Lamson. Proceedings of the Western New York Horticultural Society, 55: 49-59. 1910.

METHODS OF APPLYING WATER.

6. Practical Information for beginners in irrigation. Fortier. U. S. Farmers' Bul. 263: 5-40. 1906.
7. King's "Irrigation & Drainage,"* pp. 329-402; Emphasizing importance of water, pp. 373-391. 1907.

8. Irrigation of Orchards. Fortier. U. S. Farmers' Bul. 404: 5-36. 1910.
9. Mead. Office of Experiment Stations Bul. 145: 7-84.
10. Irrigation in fruit growing. Wickson. U. S. Farmers' Bul. 116: 3-48. 1900.
11. Irrigation in field and garden. Wickson. Farmers' Bul. 138: 5-40. 1901.

IV. ORCHARD FERTILIZATION, FRUIT THINNING AND GIRDLING.

A. FERTILIZATION.

GENERAL CONSIDERATIONS.

1. Fertility of the soil; What it is. Cavanaugh. Cornell Reading-Course for Farmers. Ser. I, No. 3, 1901.
2. Origin, Composition and Utility of Fertilizing Materials. Davidson & Ellet. Virginia Bul. 163: 3-48. 1906.
3. The Use of Fertilizers. Voorhees. New Jersey Bul. 172: 3-32. 1904.
4. The Fertilizers for Fruits and Berries. In Voorhees' "Fertilizers,"* p. 282. 1902. (Macmillan Co.)
5. Feeding the Orchard. Waters. Missouri Station Circular 22: 1-32. 1905.

AMOUNTS OF PLANT FOOD USED BY BEARING TREES.

6. Van Slyke. N. Y. Geneva Bul. 265: 205-23. 1905.
7. Warren & Voorhees. New Jersey Report. 1906. pp. 192-204.
8. Roberts. Cornell Station Bul. 103: 621-637. 1895.
9. Stewart. Pennsylvania Station Annual Report. 1910-11.

ORCHARD FERTILIZATION EXPERIMENTS AND THEIR RESULTS.

10. Fertilization of Apple Orchards. Stewart. Pennsylvania Station Bul. 100: 3-28. 1910. (Also note results of Massachusetts Experiment of p. 24 of this Bulletin).
- 10 (a). Manuring an Apple Orchard. Brooks. Mass. Sta. Rpt. 1910, pp. 10-20.
- 10 (b). Is It Necessary to Fertilize an Apple Orchard. Hedrick. N. Y. Geneva Sta. Bul. 339, pp. 153-195. 1911.
- 10 (c). Fruit Bud Formation. Pickett. N. H. Bul. 153, pp. 3-36. 1911.
11. The Effect of Wood Ashes and Acid-Phosphate on the Yield and Color of Apples. Hedrick. N. Y. Geneva Bul. 289: 211-235. 1907.

12. Summary of Station Results to 1903. Smith. U. S. Office Experiment Station Report 1903. pp. 558-62.

13. Orchard Experiments. Munson. Maine Bulletins 89, 122, 139 and 155. These bulletins give especially: (1) Results of test on value of different potash salts; (2) Relative value of manure, Fisher formula, and the station formula; and (3) the value of nitrogen (Bulletins 139: 53 and 155: 135).

14. Results of experiments with strawberries, gooseberries, raspberries, currants and apples at Woburn and Millbrook. Bedford & Pickering. Woburn Experimental Fruit Farm Report,* 1904, p. 99.

15. Blake and Farley. New Jersey Report. 1908. pp. 81-84.

16. Impressions of our Fruit Growing Industries. Bailey. N. Y. Cornell Bul. 153: 122-126. 1898.

17. Feeding the Orchard for Color. Chandler. Amer. Pomological Soc. Report. 1911. pp. 231-234.

18. Fertilizers for the Citrus Fruits. Painter. Amer. Pomological Soc. Report. 1911. pp. 54-58.

19. Fertilizer Experiments (on Pineapples). Blair & Wilson. Florida Station Bul. 101: 28-42. 1910.

19 (a). Relation of Calcareous Soils to Pineapple Chlorosis. P. L. Gile. Porto Rico Sta. Bul. 11, pp. 5-45. 1911.

RESULTS ON FERTILIZERS, OBTAINED IN ORCHARD SURVEYS.

20. Orchard Survey of Niagara County. Cummings. Cornell Bul. 262: 293-295. 1909; and Orchard Surveys by Warren. Cornell Bulletins 226: 273. 1905; 229: 473. 1905; and 307. 1911.

B. THINNING OF FRUITS.

1. Thinning Apples. Beach. N. Y. Geneva Bul. 239: 197-224. 1903.

2. Thinning Fruit. Fisher. Montana Reports 1905, pp. 281-284; and 1906, pp. 142-154.

3. Thinning Apples. Whipple. Colorado Bul. 118: 12-13. 1906. Also U. S. Farmers Bul. 73: 15-20; and 202: 16-17.

4. Thinning Apples. Close. Delaware Report 1902, pp. 91-94.

5. Thinning Fruit. Bennett. Connecticut Storrs Station Report 1903, pp. 28-32.

6. Summary of Results to 1903. Smith. U. S. Office Experiment Station Report 1903, pp. 562-563.

GIRDLING OR RINGING.

7. Stripping Bark from Apple Trees. Booth. Rural New Yorker, 1900. No. 2642, pp. 621-622.

8. Girdling Trees (and Vines) to Produce Fruitfulness. Maynard. Massachusetts Bul. 1: 12-14. 1888.

9. Ringing and Girdling. Bailey. "The Pruning Book,"* pp. 281-297. 1898. (Macmillan Co.)

V. PRUNING, GRAFTING AND ORCHARD RENOVATION.

A. PRUNING.

1. Physiology of Pruning. Bunyard. Journal Roy. Horticultural Society (London) 35 (1910) No. 3, pp. 330-34. (A general discussion.)

2. Results of Pruning Experiments. Bedford and Pickering. Woburn Experimental Farm Report, 1907, pp. 1-56.

3. Notes on Pruning. Card. Nebraska Bul. 50: 1-10. 1897. Also Rhode Island Report 1898, pp. 106-110.

4. Pruning of young fruit trees. Powell. Delaware Bul. 45: 3-16. 1899.

5. Munson. Maine Bul. 139: 60-64. 1906.

6. Summer Pruning. Gardner's Chronicle* (London) 41, 1907, pp. 400-403 and 406-7.

7. Pruning (methods). Corbett. U. S. Department of Agriculture Farmers Bul. 181: 3-73. 1903.

8. Pruning Fruit Trees. Paddock & Whipple. "Fruit Growing in Arid Regions,"* pp. 80-146. 1910. (Macmillan Co.)

9. Renewal Pruning. Goff. American Garden* 23 (1902), No. 385: 302-3.

10. Stringfellow Pruning System. Starnes. Georgia Bul. 40: 147-177. 1898.

11. Setting out and Pruning Trees. Yeomans, T. G. Country Gentleman, 66 (1896) No. 2254, p. 228. (Of historical interest mainly.)

11 (a). Grape Propagation. Pruning, Training. Husmann. Farmers' Bul. 471: 5-29. 1911.

12. Pruning and Training the Grape. "Bailey's Pruning Book,"* pp. 431-489. 1898. (Macmillan Co.)

13. Pruning. Woods. U. S. Department of Agriculture Year Book 1895: 257-268.

B. GRAFTING.

GENERAL METHODS AND PRINCIPLES.

1. Bailey's "Nursery Book,"* pp. 73-132. 1896. (Macmillan Co.)

2. Propagation of Plants. Corbett. U. S. Farmers Bul. 157: 16-23. 1902.

3. The Graft Union. Waugh. Massachusetts Tech. Bul. 2: 16. 1904.
4. Budding the Walnut. Kraus. Oregon Sta. Cir. 16: 3-8. 1911.

GRAFTING WITH WHOLE ROOTS VS. PIECE ROOTS.

4. Burrill & McCluer. Illinois Bul. 21: 73-81. 1892.
5. Mason & Jones. Kansas Bul. 65: 1-18. 1897; also Dickens & Greene, Kansas Bul. 105: 29-31. 1902.
6. Stewart. Pennsylvania Station Report 1907-8, pp. 198-200.

TOPWORKING.

7. Topworking Apple Trees. Paddock & Whipple, in "Fruit Growing in Arid Regions," pp. 147-172. 1910. (Macmillan Co.)
8. Topworking Orchard Trees. Powell. U. S. Department of Agriculture Year Book. 1902, pp. 246-58.

C. ORCHARD RENOVATION.

1. The Renovation of Worn Out Orchards. Hedrick. N. Y. Geneva Circular 6, new series, pp. 4. 1906.
2. Renovation of Old Apple Orchards. Jarvis. Connecticut (Storrs) Bul. 61: 75-89. 1910.
3. Renewal of Old Orchards. Ballou. Ohio Bul. 180: 89-110. 1907.
4. Improving an Orchard. Card. Rhode Island Bul. 83: 143-152. 1902.
5. Orchard Renewal in Southern Pennsylvania. Stewart. Penna. State Horticulture Asso. Report for 1908, pp. 50-52.

VI. PICKING, PACKING AND MARKETING FRUIT, AND UTILIZATION OF INFERIOR GRADES.

-
1. Picking Fruit. Paddock & Whipple. "Fruit Growing in Arid Regions,"* pp. 250-66. (Macmillan Co.)
 2. Apple from Orchard to Market. Lewis. Oregon Bul. 94: 4-48. 1907.
 3. Apple Packing. Judson. Western N. Y. Horticultural Society Report, 1908. pp. 71-77.
 4. Picking, Packing and Marketing the Apple. Judson. Idaho Bul. 54: 3-36. 1906.
 5. Picking, Packing and Marketing the Apple. Powell. Bureau of Plant Industry Bul. 123: 9-20. 1908.

6. Packing Apples in Barrels and Boxes. McNeill. Dairy and Cold Storage Commissioners Series, Bul. 19: 5-35. 1907. Department of Agriculture, Ottawa, Canada. Bul. 19: 5-35. 1907.

7. Packing and Grading Fruit. Paddock & Whipple. "Fruit Growing in Arid Regions,"* pp. 267-301. 1910. (Macmillan Co.)

8. Fruit Packing. Vincent. Adams County (Pa.) Fruit Growers Association Report, 1910.

9. The Packing of Apples in Boxes. Wilson. N. Y. Cornell Bul. 298: 681-693. 1911.

MARKETING METHODS.

10. Cooperation in the Packing and Marketing of Orchard Fruits. Burritt. Western N. Y. Horticultural Society Report* 1908, pp. 55-70; or Adams County (Pa.) Fruit Growers Association Report* 1907.

10 (a). Co-operation in the Handling and Marketing of Fruit. Powell. U. S. Yr. Bk. 1910, pp. 391-406.

10 (b). Chemistry and Ripening of the Date. Vinson. Arizona Bul. 66, pp. 403-435. 1911.

11. Paddock & Whipple's "Fruit Growing in Arid Region"* pp. 302-323. 1910.

12. Fruit Growers Associations. Paddock. Colorado Bul. 122: 3-18. 1907.

13. Marketing Fruit and Truck Crops. Maryland Bul. 116: 211-257; also see Nos. 2 and 3 above.

13 (a). (Co-operative Methods) Tenny. N. Y. State Fruit Growers Assoc. Rpt. 1912.

UTILIZATION OF INFERIOR GRADES OF FRUIT.

14. Evaporation of Apples. Gould. Farmers Bul. 291: 5-38. 1907.

15. Utilization of Unmerchantable Apples. Alwood. Virginia Bul. 57: 147-60. 1895.

16. Canning Peaches. Gould. U. S. Farmers Bul. 426: 5-26. 1910.

17. Use of Fruit as Food. U. S. Farmers Bul. 293: 7-38. 1907.

CIDER AND VINEGAR MAKING.

1. Cider Vinegar. U. S. Farmers Bul. 233: 28-32. 1906.

2. Commercial Handling of Cider Fruit. Grinding and Expressing the Must. Alwood. Virginia Bul. 137: 99-135. 1902.

3. Fermentation and Finishing of Ciders. Alwood. Virginia Bul. 138: 139-172. 1902.

4. Chemical Composition of Apples and Cider. Alwood et al. U. S. Bureau of Chemistry Bul.* 88: 7-46. 1904.

5. Cider Making in France, Germany and England. Alwood. U. S. Bureau Chemistry Bul.* 71: 5-114. 1903.

6. Chemistry of Homemade Cider Vinegar. Van Slyke. N. Y. Geneva Bul. 258: 439-480. 1904.

7. Results of Investigations into Cider Making. F. J. Lloyd. London Board of Agriculture & Fisheries,* 1903, pp. 1-145 abstract in Experiment Station Record XV, 930.

8. Effects of Fermentation upon Composition of Cider and Vinegar. C. A. Browne, Jr. Journal* American Chemical Society 25 (1903), No. 1, pp. 16-33.

9. French Cider Apples in Virginia. Price and Ellet, Virginia Station Report 1908, pp. 39-54.

FEEDING VALUE.

1. For Cows. Massachusetts Station Report 1904, pp. 85-87; Vermont Report 1889, pp. 54 and 74; Canada Experimental Farms Report, 1905, pp. 60-61.

2. For Pigs. Illinois Bul. 16: 503-4. 1891. New Hampshire Bul. 66: 111-116. 1899. Oregon Bul. 80: 4. 1904. Utah Bul. 101: 188-89 and 200. 1906.

VII. PEACHES AND CHERRIES.

A. PEACHES.

1. General Importance and Classes of Peaches. Smith. Office Experiment Station Report, 1906, Reprint 1029, pp. 399-403 (including foot note references.)

2. Propagation, stocks; orchard location; soils and planting. Office Experiment Station Report 1906, Reprint 1029, pp. 415-419 (and foot note references).

3. The first two seasons with a peach orchard. Blake. New Jersey Bul. 219: 5-27. 1909; Bul. 231: 3-41. 1910.

3 (a). Peach Growing in Alabama. Williams & Price. Ala. Bul. 156, pp. 111-142. 1911.

3 (b). Peach Expts. 1906-10. Garcia & Mundell. New Mexico Bul. 76, pp. 4-42, 1911.

4. Growth-period, bud-formation, blooming habits, self-fertility, and winter injury. Smith. Office Experiment Station Report, 1906, Reprint 1029, pp. 403-413 (including principle foot note references.)

5. Cultivation and Fertilization of Peach Orchards. Waite. U. S. Year Book 1902, pp. 607-626.

6. Cultivation, fertilization, thinning and pruning. Smith. Office Experiment Station Report, 1906, Reprint 1029, pp. 419-426 (and chief foot note references).

7. Cultivation vs. Mulching. *American Garden*,* No. 325, 1901, p. 168; No. 443, 1903, pp. 384-86; No. 505, 1904, p. 662.

8. Harvesting, shipping, storing, canning, profits etc., Smith. Office Experiment Station Report 1906, Reprint 1029, pp. 426-34 (and leading foot note references.)

9. Studies on Peaches. (Analyses; and changes in composition during growth, ripening and storage. Technical). Bigelow & Gore. U. S. Bureau of Chemistry Bul. 97: 5-32. 1905.

INSECT ENEMIES ON THE PEACH.

10. Peach tree borer. Slingerland. Cornell Bul. 176: 157-232. 1899; Bul. 192: 191-196, 1901.

11. Peach tree borer. Starnes. Georgia Bul. 73: 149-189. 1906.

12. Control of borers by immune stocks. Blake. New Jersey Report. 1907, pp. 129-130.

13. The principal insect enemies of the peach. Quaintance. U. S. Year Book 1905, pp. 325-348.

PEACH DISEASES AND THEIR CONTROL.

14. The control of peach brown-rot and scab. Scott & Ayres. Also see Ref. IX 35, U. S. Bureau of Plant Industry Bul.* 174: 7-26. 1910.

15. Peach yellows and little peach. Blake. New Jersey Bul. 226: 3-26. 1910.

16. Peach yellows. Clinton. Connecticut Report 1908, pp. 872-78.

17. Peach leaf curl. Duggar. Cornell Bul. 164: 371-388. 1899.

18. Contribution to the study of Bordeaux injury on Peaches. Groth. New Jersey Bul. 232: 3-20. 1910.

B. CHERRIES.

1. The cherry in North America. Macoun, Little & Farrand. American Pomological Society Special Report* 1904-5, pp. 14-29.

2. The cherry in Delaware. Powell. Delaware Bul. 35: 1-23. 1897; also Delaware Report 1900, pp. 99-129.

3. Cherries in Iowa. Price & Little. Iowa Bul. 73: 48-60. 1903.

4. Cherry. Powell & Wickson. In Bailey's "American Cyclopaedia of Horticulture,"* pp. 291-4. 1900.

5. Stocks for cherries. Iowa Buls. 10, 22, 28; Canada Experimental Farms Report 1893, p. 117; Bailey's "Nursery Book,"* p. 206. 1896.

6. Culture and Grafting. Rural New Yorker* 1910; 489 and 494.

7. Cherries in Washington. Thornber. Washington Bul. 92: 3-32. 1910.

VIII. PLUMS, PEARS AND QUINCES.

A. PLUMS.

1. Propagation. Waugh's "Plums and Plum Culture,"* pp. 235-250. 1901. (Orange Judd Co.)
2. Selection of Varieties. Waugh's "Plums and Plum Culture,"* pp. 251-264; 308-316.
3. Notes upon Plums (chiefly domestica). Willard and Bailey. Cornell Bul. 131: 169-195. 1897.
- 3 (a). Pollination of Bartlett & Kieffer Pears. Fletcher. Va. Sta. Rpt. 1909-1910, pp. 12.
4. Plum varieties (chiefly Americanas). Little. Iowa Bul. 114: 121-149. 1910.
5. Japanese plums. Bailey. Cornell Bul. 106: 39-67. 1896; Cornell Report 1898, pp. 369-382; also *Mead* in Rural New Yorker, 1901, p. 103.
6. Hybrid plums (technical). Waugh. Vermont Bul. 67: 3-30. 1898; Vermont Report 1899, pp. 218-230.

CULTURE.

7. Waugh's "Plums and Plum Culture,"* pp. 265-281; also Vermont Bul. 89: 19-28. 1901; abstract in U. S. Farmers Bul. 149: 20-25. 1902.
8. Culture of native plums. Goff. Wisconsin Bul. 63: 3-26. 1897.
9. Culture in Iowa. Craig. Iowa Bul. 46: 234-242; 295-303. 1900.
10. Culture in Ohio. Green & Ballou. Ohio Bul. 162: 229-235 (cultural) and pp. 236-258 (varieties).

POLLINATION.

11. Waugh's "Plums and Plums Culture,"* pp. 282-307. 1901. (Orange Judd Co.)
12. Pollination. Vermont Bul. 53: 47-64. 1896; and Vermont Station Report 1899, pp. 189-209. Abstract and comparison in U. S. Farmers Bul. 65: 14-19; and 103: 6-13. 1899.
13. Influence of weather, vigor, etc., upon setting of fruits. Goff. Wisconsin Report 1901, pp. 289-303.
- 13 (a). Preliminary Frost Fighting Studies in the Rogue River Valley. Lewis & Brown. (Also see files of *Better Fruit*). Oregon Sta. Bul. 110: 3-62. 1911.

FLOWER DEVELOPMENT AND GROWTH PERIOD.

14. Flower development in cherry, plum, apple and pear. Goff. Wisconsin Report 1899, pp. 289-303.

15. Bud development in the wild plum. Waldron. North Dakota Report 1900, pp. 31-39.

15 (a). Fruit Bud Formation and Development. Drinkard. Va. Sta. Rpt. 1909-10, pp. 47.

16. Growth period in trees. Goff. Wisconsin Reports 1898: 220-228; and 1900: 291-294; and Cranefield Wisconsin Report 1900: 300-308. Also compare New Jersey Report 1906, p. 223. Warren & Voorhees; and Keffer Tennessee Bul. XIV No. 4: 3-16. 1901.

DISEASES.

17. Waugh's "Plums and Plum Culture,"* pp. 317-348.

COOKING AND ORNAMENTAL USE.

18. Waugh's "Plums and Plum Culture,"* pp. 349-362.

B. PEARS.

1. General discussion, origin and classes. Bailey's "Cyclopedia of American Horticulture,"* pp. 1242-1244. 1901.

2. The Kieffer; dwarf pears; etc., Collins, Yeomans and G. T. Powell "Cyclopedia of American Horticulture,"* pp. 1250-1252.

CULTURE.

3. Commercial culture. Waite. Year Book 1900, pp. 369-396.

4. Soils, propagation and general care. T. T. Lyon. In "Cyclopedia of American Horticulture,"* pp. 1244-1249. 1901. (Doubleday, Page & Co.)

5. Culture in New Jersey. A. T. Jordan. New Jersey Bul. 142: 3-14. 1910.

6. Culture in New York. J. B. Cornell. Rural New Yorker, 1901, 163; also in American Pomological Society Special Report* 1904-5, pp. 61-64.

7. Culture in Virginia. Alwood. Virginia Bul. 49: 19-32. 1895.

C. QUINCES.

1. Quinces in Western New York. Bailey. Cornell Bul. 80: 609-31. 1894.

2. W. W. Meech's "Quince Culture,"* 1888. (Orange Judd Co.)

3. Craig. In Bailey's "Cyclopedia of American Horticulture,"* pp. 1485-1486. 1901.

IX. THE CONTROL OF INSECTS AND DISEASES.

A. GENERAL CONTROL: CONDENSED DIRECTIONS.

1. Control of Insects and Disease Affecting Horticultural Crops. Fulton, Wright and Gregg. Pennsylvania Station Bul. 110: 3-44. 1911.
2. Control of Insect Pests and Plant Diseases. Slingerland, Her-
rick, Crosby and Whetzel. Cornell Bul. 283: 465-498. 1910.
3. Spraying Peaches for the Control of Brown-rot, Scab and Cur-
culio. Scott and Quaintance. U. S. Farmers Bul. 440: 5-40. 1911.
4. Calendar for the Treatment of Plant Diseases and Insect Pests.
Green, Selby and Gossard. Ohio Bul. 199: 89-102. 1908.
5. Control of Insects and Plant Diseases. Jarvis. Connecticut
Storrs Station Bul. 56: 220-282. 1909.
6. Control of Plant Diseases. Wilcox and Stone. Nebraska 22nd
Annual Report, pp. 22-63. 1909.
7. Common diseases and insects injurious to fruits. Beech, Lowe
and Stewart, F. C. N. Y. Geneva Bul. 170: 381-445, 1899.
8. Plant Diseases and Spray Calendar. Norton and Norman.
Maryland Bul. 143: 177-215. 1910. (Also discusses pumps and noz-
zles).
9. Orchard and Garden Spraying. Ruggles and Stakman. Minne-
sota Bul. 121: 3-32. 1911.
10. Pests and Their Treatment. Surface. Pennsylvania Depart-
ment of Agriculture. (Harrisburg) Zoological Bul. Vol. I, No. I, pp.
4-61. 1911.

PUBLICATIONS ESPECIALLY USEFUL IN THE IDENTIFICATION OF PESTS.

11. Insects Injurious to Fruits in Michigan. Petit. Michigan
Special Bul. 24: 5-64. 1904.
- 11 (a). California Plant Diseases. R. E. & E. H. Smith. Califor-
nia Bul. 218: 1039-1193. 1911.
12. Apple Tree Insects of Maine. Patch and Johannsen. Maine
Station Miscellaneous Pub. 383, pp. 1-67. June 1910.
13. Fungous Diseases of Fruits in Michigan. Longyear. Michigan
Special Bul. 25: 3-68. 1904.
14. Some Apple Diseases. Brooks. New Hampshire Bul. 144: 109-
138. 1909.
15. Maine Apple Diseases. Morse and Lewis. Maine Bul. 185:
337-382. 1910.
16. Handbook of the Diseases of Cultivated Plants in Ohio. Selby.
Ohio Bul. 214: 307-456. 1910.

17. Notes on New York Plant Diseases, I. Stewart, F. C. N. Y. Geneva Bul. 328: 305-404. 1910.

18. Duggar's "Fungous Diseases of Plants,"* pp. XII+508. 1909. (Ginn & Co.)

19. "Diseases of Economic Plants,"* Stevens & Hall, pp. X+513. 1910. (Macmillan Co.)

20. "Insects Injurious to Fruits."* Saunders, pp. 436. 1883. (J. B. Lippincott Co.)

B. PUBLICATIONS DEALING WITH THE PROTECTION OF CERTAIN CROPS.

21. Principal Insect Enemies of the Peach. Quaintance. Reprint Year Book 1905. U. S. Department of Agriculture, pp. 325-348.

22. Insects Injurious to Peach Trees in New Jersey. Smith. New Jersey Bul. 235: 3-43. 1911.

23. Some Important Pear Diseases. Duggar. Cornell Bul. 145: 597-627. 1898.

24. Insect Enemies of Cantaloupes, Cucumbers, and Related Plants. Smith, R. I. North Carolina Bul. 205: 340. 1910.

25. Cabbage Worms and (their Control). Rumsey & Brooks. West Virginia Bul. 120: 345-352. 1909.

26. The Cabbage Aphis. Herrick & Hungate. Cornell Bul. 300: 717-746. 1911.

27. Insects of Field Crops. Petit. Michigan Bul. 258: 36-84. 1910.

28. A Preliminary Report on Grape Insects. Hartzell. N. Y. Geneva Bul. 331: 485-581. 1910.

29. Cutworms, Army Worms, and Grasshoppers. Washburn. Minnesota Bul. 123: 67-84. 1911.

C. THE NATURE AND CONTROL OF CERTAIN FRUIT DISEASES.

ATTACKING THE APPLE.

30. Spraying for Apple Diseases and The Codling Moth in the Ozarks. Scott and Quaintance. U. S. Farmers Bul. 283: 5-42. 1907.

31. Fire Blight of Pear, Apples, Quinces, etc., Whetzel & Stewart, Cornell Bul. 272: 31-51. 1909.

32. Apple Blotch. Scott & Rorer. Bureau of Plant Industry. Bul.* 144: 7-28. 1909.

33. Apple Diseases Caused by *Coryneum* and *Phoma*. Lewis Maine Bul. 170: 185-200.

34. Control of Apple Bitter-rot. Scott. Bureau of Plant Industry Bul.* 93: 7-33. 1906.

ATTACKING THE PEACH.

35. Control of Brown-rot, Scab and Curculio. Scott and Quaintance. U. S. Farmers Bul. 440: 5-40. 1911.
36. Control of Peach Brown-rot and Scab. Scott & Ayres. Bureau of Plant Industry Bul.* 174: 7-31. 1910.
37. Peach Leaf Curl. Wallace & Whetzel. Cornell Bul. 276: 157-178. 1910.
38. Peach Yellows and Little Peach. Blake. New Jersey Bul. 226: 3-26. 1910.
39. Summer Spraying of Peaches. Stewart. Pennsylvania State Horticultural Association Report. 1911, pp. 181-195.

ATTACKING THE GRAPE.

40. The Black Rot Disease of Grapes. Reddick. Cornell Bul. 293: 289-364. 1911. (Technical).
41. Spraying for Black Rot in a Dry Season. Reddick Wilson and Gregory. Cornell Bul. 296: 573-588. 1911.
42. The Control of Black-rot of the Grape. Shear, Miles and Hawkins. Bureau of Plant Industry Bul.* 155: 7-42. 1909.
- 42 (a) The Grape Root Worm. Johnson & Hamman. Bureau of Entomolgy. Bul. 89: 9-33. 1910.

ATTACKING THE TOMATO.

43. Tomato Blight and Rot in Virginia. Reed. Virginia Bul. 192: 3-16. 1911.

D. THE CONTROL OF CERTAIN INSECTS, ETC.

SCALE INSECTS.

44. The San Jose Scale and its Control. Quaintance. Bureau of Entomology Circular 124: 1-18. 1910.
- 44 (a). The Summer Control of San José Scale. Stewart. Rural New Yorker, 1910, p. 944.
45. Spraying, Fumigating and Dipping for the Control of San Jose Scale. Symons, Peairs and Cory. Maryland Bul. 148: 47-81. 1910.
46. The Terrapin Scale. Symons and Cory. Maryland Bul. 149: 83-92. 1910.
47. The Oyster Shell Scale. New Hampshire Circular 4: 1-4. 1908.
- 47 (a). Citrus Fruit Insects. Quayle. Calif. Bul. 214: 443-472. 1911.
- 47 (b). The Red or Orange Scale. Quayle. Calif. Bul. 222: 99-150. 1911.

MISCELLANEOUS INSECTS ATTACKING THE APPLE.

48. The Apple Red Bugs. Crosby. Cornell Bul. 291: 213-225. 1911.
49. Life History of the Codling Moth in Northwestern Pennsylvania. Hammar. Bureau of Entomology Bul. 80: Part VI: 71-111. 1910. (Technical).
50. On Certain Seed-Infesting Chalcis Flies. Crosby. Cornell Bul. 265: 367-388. 1909.
51. The Apple Leaf Hopper. Webster. Iowa Bul. 111: 3-32. 1910.
52. The Fruit-tree Leaf-roller. Stedman. Missouri Bul. 71: 3-21. 1906.
53. Apple Maggot and other Insects. Patch and Munson. Maine Bul. 109: 169-184. 1904.
54. The Apple and Pear Mites. Parrott, Hodgkiss and Schoene. N. Y. Geneva Bul. 283: 281-318. 1906. Also Geneva Bul. 306: 413-438. 1908.
55. The Larger Apple Tree Borers. Chittenden. Bureau of Entomology Circular 32: 1-11. 1907.

CONTROL OF MICE AND RABBITS

56. Meadow Mice in Relation to Agriculture and Horticulture. Lantz. Reprint U. S. Department of Agriculture Year Book for 1905, pp. 363-376.
57. Protecting Trees from Rabbits. Cunningham. Kansas Circular 17: 1-4, 1911.

X. SPRAY MATERIALS: PREPARATION, USE, MACHINERY, LEGISLATION, ETC.

A.—LIME-SULPHUR.

CONDENSED PRACTICAL DIRECTIONS.

1. Preparation and Use of Concentrated Lime-Sulphur. Stewart. Pennsylvania Station Bul. 99: 3-15. 1910. Also Bul. 115: 1912.
2. Practical and Popular Treatment. Caesar. Ontario Agricultural College Bul. 177: 34-64. 1909.
3. Lime-sulphur as a Summer Spray. Wallace. Cornell Bul. 289: 141-162. 1911.
4. Experiments with Concentrated Home-made Lime-sulphur. Parrott and Schoene. N. Y. Geneva Bul. 330: 451-484. 1910.
5. [Preparation and Use of Self-Boiled Lime-sulphur]. Scott and Quaintance. U. S. Farmers Bul. 440: 33-40. 1911.

THE DEVELOPMENT AND TECHNIQUE OF LIME-SULPHUR.

6. Recent Advances in our Knowledge of Lime-sulphur. Stewart. Cornell Countryman, Feb. 1911; and reprint from The Pennsylvania State Horticultural Association Report, 1911, pp. 1-5.

7. Concentrated Lime-sulphur: Its Properties, Preparation and Use. Stewart. Pennsylvania Station Annual Report 1908-09, pp. 259-296. Also Pennsylvania Station Bul. 92: 3-20. 1909.

8. Chemical Investigation of Best Conditions for Making the Lime-sulphur Wash. Van Slyke, Bosworth and Hedges. N. Y. Geneva Bul. 329: 405-449. 1910.

9. The Lime-sulphur Wash. Chemical Study: Fulmer. Ontario Agricultural College Bul. 177: 4-33. 1909.

10. Lime-sulphur Spray. Harris. Michigan Technical Bul. 6: 3-15. 1911.

11. Manufacture and Storage of Lime-sulphur Spray. Patten. Michigan Circular 10: 71-77. 1911.

12. Studies of the Fungicidal Value of Lime-sulphur. Wallace. N. Y. Cornell Bul. 290: 167-207. 1911.

B. BORDEAUX MIXTURE.

13. Brief Directions for preparation are given in references 1, 2, 4, 5, etc., of our Section IX above.

14. History and Preparation. Crandall. Illinois Bul. 135: 201-217. 1909. Also, Fairchild, U. S. Division of Veg. Pathology Bul. 6: 7-30. 1894, and Lodeman's "Spraying of Plants,"* pp. 24-30, and 125-133. 1896. (Macmillan Co.)

15. "Woburn" Bordeaux. Bedford & Pickering. Woburn Experimental Farm Report* -- (1909), pp. v+191; Journal Agricultural Science 3 (1909) No. 2,* pp. 171-178; abstracts in Experiment Station Record. XXIII, pp. 50-51, and Experiment Station Record XXIII. 455-456.

16. Action of Lime in Excess on copper sulphate solutions. Bell & Taber. Journal Physical Chemistry 11 (1907) No. 8*, pp. 632-636; abstracts in Experiment Station Record XXII, pp. 456-457. (Technical).

C. MISCIBLE OILS.

17. How to make them. Penny. Pennsylvania Station Bul. 86: 3-20. 1908; and Delaware Bul. 79: 3-40. 1907.

18. Proprietary and Homemade. Jarvis. Storrs Connecticut Bul. 54: 169-197. Dec. 1908.

D. ARSENICALS.

19. Directions for use are found in references 1, 2, 4, 5, of Section IX and in references 1 and 3 of the present Section X.

20. Lead Arsenate. Composition, home-preparation and action on Foliage. Haywood and McDonnell. U. S. Bureau of Chemistry Bul.* 131: 5-49. 1910.

20 (a). The Significance of Lead Arsenate Composition. Volck. Science, 1911, pp. 866-870.

20 (b). Preliminary Report on the Effects of Arsenical Compounds upon Apple Trees. Swingle & Morris. Reprint from *Phytopathology*, June, 1911, pp. 79-93.

20 (c). "Takanap Soap Co., Darby, Pa. (Fine soap for making kerosene emulsion without heating).

E. SPRAY INJURY.

21. Spray Injury of Lime-sulphur and Arsenicals. Stewart. In Pennsylvania State Horticultural Association Report 1911, pp. 186-189. (Reprint obtainable from the author.) Further discussion in Pennsylvania Station Bul. 106: 11-13. 1910; and Pennsylvania Station Report 1908-09, pp. 286-292; and New Jersey Hort. Society Rpt. for 1911.

22. Spray Injury Induced by Lime-sulphur preparations. Wallace. Cornell Bul. 288: 105-137. 1910.

23. Orchard Spraying Experiments. Bonns. Maine Bul. 189: 33-80. 1911.

24. Bordeaux Injury. Crandall. Illinois Bul. 135: 217-296. 1909.

25. Bordeaux Injury on Peaches. Groth. New Jersey Bul. 232: 3-20. 1910.

26. Bordeaux Injury. Hedrick. N. Y. Geneva Bul. 287: 107-182. 1907.

27. The action of Copper on Leaves. Bain. Tennessee Bul. XV. No. 2, pp. 21-108. 1902.

ARSENICAL INJURY.

28. Headden. Arsenical Poisoning of Fruit Trees. Colorado Bul. 157: 3-56. 1910.

29. (Discussion of Arsenical Poisoning), Grossenbacher. N. Y. Geneva Technical Bul. 12: 395-397. 1909.

F. DUST VS. LIQUID SPRAYING.

30. Dust vs. Liquid Spraying. Close. Delaware Bul. 72: 3-23. 1906.

31. Spraying vs. Dusting. Faurot. Missouri Fruit Station Bul. 19: 3-24. 1908.

G. SPRAYING TO CONTROL WEEDS.

32. Spraying to Control Weeds. Selby. Ohio Circular 102: 1-6. 1910.

33. Weed Control by Means of Chemical Sprays. Bolley. North Dakota Bul. 80: 513-573. 1908.

34. Killing Mustard and Other Weeds with Iron Sulphate. Olive. South Dakota Bul. 112: 485-498. 1909.

35. Weeds, Their Eradication and Control. Rhode Island Bul. 133: 51-61. 1909.

36. Spraying for Weeds. U. S. Farmers Bul. 360: 291-293. 1909. (Also gives references).

37. Eradication of Farm Weeds. Publications of the American Steel & Wire Co., Chicago, Ill. January 1909, pp. 2-16; and Nov. 1909, pp. 2-15.

37 (a). Spraying to Eradicate Dandelions from Lawns. French. New York. (Geneva) Bul. 335: 35-44. 1911.

H. SPRAY MACHINERY.

38. Spray Mixtures and Spray Machinery. Beach, Clark and Taylor. N. Y. Geneva Bul. 243: 339-373. 1903.

39. Spray Machinery. Taylor. Missouri Fruit Station Bul. 20. 1909.

39 (a). Roller Tank Sprayer. Van Deman. R. New Yorker, 1911, p. 735.

39 (b). Spraying Machinery. Goodman. Ohio Bul. 216: 491-526. 1910.

MANUFACTURERS OF SPRAY MACHINERY.

American Sprayer Co., Minneapolis, Minn.

Barnes Mfg. Co., Mansfield, Ohio.

Bean Spray Pump Co., Cleveland, Ohio.

Binks Spraying Machine Co., Chicago, Ill.

Brandt Manufacturing Co., Hastings, Minn.

E. C. Brown Co., Rochester, N. Y.

Cushman Sprayer Co., Lincoln Nebr.

Dayton Supply Co., Dayton, Ohio.

Deming Co., Salem, Ohio.

R. H. Deyo & Co., Binghamton, N. Y.

W. & B. Douglas, Middletown, Conn.

Fairbanks, Morse & Co., St. Paul Minn.

Field Force Pump Co., Elmira, N. Y.

Friend Mfg. Co., Gasport, N. Y.

Gilson Mfg. Co., Port Washington, Wis.

Goulds Mfg. Co., Seneca Falls, N. Y.

Hardie Mfg. Co., Hudson, Mich.

Horticultural Chemical Co., 12th and Chestnut Sts., Phila., Pa.

Hurst Mfg. Co., Canton, Ohio.

International Harvester Co., Chicago, Ill.

Latham & Co., Sandusky, Ohio.

Leggett & Brother, 301 Pearl St., New York City.
 Morrill & Morley, Benton Harbor, Mich.
 F. E. Myers & Bro., Ashland, Ohio.
 The New Way Motor Co., Lansing, Mich.
 Niagara Sprayer Co., Middleport, N. Y.
 Olds Gas Power Co., Lansing, Mich.
 W. H. Owen Spraying Co., Sandusky, Ohio (Furnish tanks and
 Compressors for compressed-air outfits).
 Quincy Engine Co., Quincy, Pa.
 Spramotor Co., Buffalo, N. Y.
 Wm. Stahl Sprayer Co., Quincy, Ill.

Note: In buying an outfit it is well to write to a number of the better and more available firms, stating what is required of the outfit and asking for catalogs and recommendations. References 38 and 39 and some of the references in Section IX, such as 5, 8 and 9, give important characteristics that should be found in spray machinery.

I.—LEGISLATION AND COMPOSITION.

41. The Federal "Insecticide Act of 1910." Public — No. 152, pp. 1-5. (Obtainable from Congressmen).
42. Analysis of Paris Green (and Pennsylvania Paris Green Law). Kellogg. Pennsylvania State Department of Agriculture Bul. 192: 9-37. 1910. Also Bull. 204: 9-33. 1911.
43. Insecticide Studies (and State Laws on Insecticides). Haywood. U. S. Bureau of Chemistry Bul. 76: 7-63. 1903.
44. Insecticides. Lead Arsenate. Composition, Home-preparation and action on foliage. Haywood & McDonnell. U. S. Bureau of Chemistry Bul. 131: 5-49. 1910.
45. Analyses of Paris Green and lead arsenate. Cathcart. New Jersey Bul. 214: 3-14. 1908. (Technical).
46. Insecticides and Fungicides (Chemical composition and analytical methods). Haywood. U. S. Bureau of Chemistry Bul. 68: 7-58. 1902; and U. S. Farmers Bul. 146: 7-14. 1902.
47. Lead Arsenate and Paris Green. Street and Britton. Connecticut Bul. 157: 3-13. 1907.

MANUFACTURERS OR WHOLESALEERS OF SPRAY MATERIALS.

Ansbacker & Co., 253 Broadway, New York City.
 Bowker Insecticide Co., 43 Chatham St., Boston, Mass.
 Fergusson Bros., 109 Chestnut St., Philadelphia, Pa. (Copper Sulphate.)
 Good, James, 934-941 N. Front St., Philadelphia, Pa. (Fish Oil Soap.)

Grasselli Chemical Co., Cleveland, Ohio.
 Hemingway's London Purple Co., 133 Front St., New York City.
 Horticultural Chemical Co., 12th & Chestnut Sts., Phila., Pa.
 Kentucky Tobacco Product Co., Louisville, Ky.
 Fred L. Lavanburg, 100 William St., New York City.
 The Dow Chemical Co., Midland, Mich.
 Mechling Bros. Mfg. Co., Camden, N. Y.
 Merrimac Chemical Co., 33 Broad St., Boston, Mass.
 Niagara Spraying Co., Middleport, N. Y.
 B. G. Pratt & Co., 50 Church St., New York City.
 Sherwin-Williams Paint Co., Cleveland, Ohio.
 Aphine Mfg. Co., Madison, N. J. (Aphine).
 Taylor, E. R., Penn Yan, N. Y. (Fuma Carbon bi-sulphid).
 Thomsen Chemical Co., Baltimore, Md.
 Thum, O. & W. Co., Grand Rapids, Mich. (Sticky materials for
 tree banding).
 E. C. Tyson, Floradale, Pa. (General Sales Agent for Spray
 Materials).
 Vreeland Chemical Co., 50 Church St., New York City.



Commonwealth of Pennsylvania.

DEPARTMENT OF AGRICULTURE, DAIRY AND FOOD DIVISION

BULLETIN No. 216

CHEAP CONFECTIONERY

ANALYSES MADE BY

CHARLES H. LAWALL, *Chemist*



N. B. CRITCHFIELD, *Secretary of Agriculture*

JAMES FOUST, *Dairy and Food Commissioner*

Published by Direction of the Secretary

HARRISBURG:
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LETTER OF TRANSMITTAL.

Harrisburg, Pa., *December 1, 1911.*

Hon. N. B. Critchfield, Secretary of Agriculture:

Dear Sir: I have the honor to submit herewith a report by Professor Charles H. LaWall, Chemist to the Dairy and Food Division of the Department of Agriculture, presenting the results of a recent investigation upon the quality, as respects conformity to the Food Act of May 13th, 1909, of the cheap confectionery sold in this Commonwealth. In view of the wide public interest in the subject, I recommend that it be published as a Bulletin of this Division.

I have the honor to remain,

Very respectfully,

JAMES FOUST,
Dairy and Food Commissioner.



PREFACE.

In view of the great and growing consumption of confectionery by the people of this country, and especially by children, the question of the wholesomeness of confectioners' wares is of interest to every citizen. The following report, covering a wide range of the cheaper confections, such as are bought chiefly by children, exhibits a marked improvement in the character of the ingredients used by the manufacturers. This is a matter for congratulation to all concerned. The findings reported indicate, however, that there is room for great improvement in the manner in which these products are kept and exposed for sale.

N. B. CRITCHFIELD,
Secretary of Agriculture.



Philadelphia, Pa., *December 1, 1911.*

James Foust, Dairy and Food Commissioner, Harrisburg, Pa.:

Dear Sir: I submit herewith the result of my investigations of a number of candy samples collected by Agents Banzhoff, Cassidy and Linton in various parts of the State of Pennsylvania. Purchases were made in more than thirty counties and comprised a range of varieties of the cheaper grades of candy known as "penny specialties," which range was purposely made as complete as possible in order to ascertain whether or not cheap candies as sold in the State of Pennsylvania are in compliance with the law which specifically prohibits a number of harmful ingredients.

So far as these investigations are concerned, and I have endeavored to make them as complete as possible, I am pleased to report that out of more than two hundred and fifty samples examined, only four were found to contain substances specifically prohibited by law, and so far as harmful ingredients are concerned I believe that the penny candies at the present time stand upon the same high plane in this State as do many other food products in which a great improvement in quality has been brought about by a fearless and continual enforcement of the laws and by the widespread publicity which has always been given to such forms of adulteration as have been discovered and prosecuted in the past.

In taking up the work, I was first led to examine the literature on the subject, and I found that the most extensive investigation of which any published results were available, was that undertaken by the U. S. Department of Agriculture in 1892 under the direction of Dr. H. W. Wiley, Chief Chemist, and published as Part VI of Bulletin No. 13 of the Department.

In this Bulletin are detailed the analyses of 250 samples purchased in different parts of the United States but the results, upon close examination, are found to be rather disappointing, as no specific tests seem to have been made for such substances as saccharin, sulphurous acid, etc., while the main details as reported are concerned with the amount of sucrose, reducing sugars, water and ash, the last factor alone having any specific bearing upon the question of adulteration. I therefore decided to confine my labors to the search for such substances as are specifically prohibited by law and to ignore the unimportant details as to the relative amounts of sucrose, dextrose, etc., which merely indicate the relative proportion of cane sugar and glucose used in the manufacture of candy or the temperature at or length of time which it has been cooked.

The first factor concerning which notes have been made in every instance, is that of the appearance of the sample. In my experience of many hundreds of samples examined, I have been impressed with

the fact that the candy is often in a filthy and unwholesome condition. This is due to the sticky character of the surface of many varieties, and the fact that the cheap candies as sold by street vendors are exposed to dust and dirt, often without any covering or protection. The blame for any condition of this kind meriting condemnation most frequently lies with the retailer, although in some few instances I have been shocked by the state of the goods in an unopened package purchased from the jobber as coming directly from the manufacturer. It is optional, of course, with the purchaser, whether he will accept goods of this kind or not; but when the purchaser is a child who is too young to notice or care whether the candy is clean or dirty, the moral responsibility undoubtedly rests with the retailer, and the sale of dirty candies should, therefore, be made punishable by law.

I commend most heartily the practice of a number of manufacturers of wrapping each retailing piece of candy in waxed paper, which effectually protects it from dirt and insures its reaching the consumer in a satisfactory and sanitary condition. While it is not possible to do this in every case, the proportion could be greatly increased. In this investigation, 40 out of 259 samples were thus protected.

At the same time that notes were made concerning the appearance, portions of the candy were weighed and the results calculated so as to express the amount received in ounces for 1 cent. The variation in this respect will be found remarkable, ranging from .21 to 2.11, indicating a cost to the consumer of from 76 cents a pound down to 7½ cents a pound.

The presence of talc, terra alba or similar insoluble earthy materials was specifically sought in each sample. With the exception of three samples in which small amounts of talc had been used in polishing the goods, no evidence of these adulterants was found, nor have I ever found any candy which contained notable quantities of such earthy matter, a condition which is contrary to the popular impression regarding cheap candies.

Tests were made of each sample for the presence of sulphur dioxide. It will be remembered that about five years ago, when bleached glucose was used that had been deprived of its color by the use of sulphur dioxide, comparatively large amounts of this harmful constituent was allowed to remain in the glucose, which, being used to a considerable extent in the making of candy, thereby contaminated this article. Of several hundred samples examined in 1905, at least 90 per cent. contained sulphur dioxide. It will also be remembered that a year ago a number of samples collected in the Philadelphia market were found to be contaminated with small amounts of sulphur dioxide, which at that time came from the use of bleached gela-

tin or glue used in the manufacture of candy. The difference between gelatin and glue is merely one of quality, both being derived from similar sources, and it is impossible to detect the difference in a made up sample of candy by any chemical tests. I speak with knowledge, however, when I assert that glue has been used by unscrupulous manufacturers in place of gelatin, for I possess samples of the product, dark brown in color and as offensive as any article used for the most technical purpose. This product was found in actual use in the manufacture of candy, and I have examined samples of so called gelatin which contained nearly one-half per cent. of sulphur dioxide, indicating either gross carelessness in manufacture or an origin of unspeakable offensiveness requiring heroic antiseptic measures.

The result of these examinations for sulphur dioxide showed that a notable and commendable change has come over the situation, for in only a single sample was a detectable amount found.

The statement has frequently been made that candies sometimes contain saccharin as an added sweetening agent, or that preservatives such as salicylic or benzoic acids are occasionally used. I have never fully credited these allegations, and a careful examination of every sample in this respect revealed the fact that none of these substances was present.

Tests were made of the coloring matter where present in sufficient amount, to ascertain whether it was of coal tar origin or vegetable origin and whether any but the colors in the permitted list were used. In this connection I can say that no instance was found in which any but the authorized colors were used when single colors were present. Where a mixture or a number of colors occurred in the same piece of striped candy no attempt was made to effect a separation, as the extra labor would have unnecessarily prolonged the work. It is gratifying to note that the use of Venetian red, burnt umber, and similar mineral pigments, which were occasionally found several years ago in cheap chocolate confections, has been entirely discontinued.

An investigation was also made of the character of the fat found in chocolate coated candies or candies composed largely of chocolate to ascertain the prevalence of the substitution of foreign fats for chocolate. A few instances were found where this substitution had undoubtedly taken place, while a few others had to be classed as doubtful, owing to the insufficiency of material with which to work as the coating of chocolate is often so thin on the cheaper grades of candy that several pounds of the candy are necessary in order to obtain enough of the fat to examine. In this connection I would state that the fault for any deception in this respect probably rests with the manufacturer, for I have observed in a number of instances where

I have had original packages of supposedly chocolate coated penny specialties, that the manufacturer is careful to omit the use of the word chocolate, either on the label of the box or on the bill, while the retailer who judges by external appearances only and who has probably ordered chocolate coated goods, sells the articles in ignorance of the fact that a technical offence has been committed in selling such goods for chocolate goods.

The following descriptions of the articles as tabulated have been as brief as is consistent with proper identification of the sample. Trade marked names or designations have been purposely avoided in order that the information contained in this Bulletin might not be put to improper use. The tabulated results are herewith appended:

CHEAP CONFECTIONERY

TABULATED RESULTS

TABULATED

Agent's number.	Kind of Candy.	Oz. average for 1 cent.	Appearance.	Color.
4358	Suckers, ...	1.23	Good, ...	Coal tar, ...
4359	Chocolate coated marshmallow squares with nut on each, ...	0.67	Fair, ...	None, ...
4360	Marshmallow blocks, chocolate coated, ...	0.88	Good, ...	Coal tar, ...
4361	Chocolate coated peanut bars, ...	0.67	Inferior, ...	None, ...
4362	Marshmallow revolvers, ...	0.78	Inferior, ...	None, ...
4363	Candy eggs, ...	0.60	Good, ...	Coal tar, ...
4364	Marshmallows, ...	0.60	Good, ...	None, ...
4365	Butterscotch, ...	0.85	Good, ...	None, ...
4366	Chocolate discs, ...	0.81	Good, ...	None, ...
4367	Chocolate cigars, ...	0.56	Inferior, ...	None, ...
4368	Chocolate creams, ...	0.67	Good, ...	None, ...
4369	Chocolate coated eggs, ...	0.64	Good, ...	None, ...
4370	Chocolate chips, ...	0.71	Good, ...	None, ...
4371	Marshmallow rabbits, ...	0.81	Inferior, ...	Coal tar, ...
4372	Chocolate covered caramels, ...	0.71	Good, ...	None, ...
4373	Candy strawberries, ...	0.60	Good, ...	Coal tar, ...
4374	Caramels, ...	0.99	Good, ...	Vegetable, ...
4375	Marshmallow shortcake, ...	0.71	Good, ...	Coal tar, ...
4376	Date balls, ...	1.27	Good, ...	None, ...
4377	Chocolate fudge, ...	0.88	Good, ...	None, ...
4378	Marshmallow fruit, ...	0.49	Good, ...	Coal tar, ...
4379	Chocolate bars, ...	0.88	Good, ...	None, ...
4380	Marshmallow sandwich, ...	0.67	Good, ...	Coal tar, ...
4381	Nougat, ...	0.92	Good, ...	None, ...
4382	Orange bars, ...	1.05	Good, ...	Coal tar, ...
4383	Candy potatoes, ...	1.09	Inferior, ...	None, ...
4384	Marshmallow babies, ...	0.96	Inferior, ...	Coal tar, ...
4385	Cocoanut candy, ...	0.95	Good, ...	None, ...
4386	Stick candy, ...	1.05	Good, ...	Coal tar, ...
4387	Caramels, ...	1.05	Good, ...	None, ...
4388	Marshmallow candy, ...	0.64	Inferior, ...	Coal tar, ...
4389	Marshmallow fish, ...	0.74	Inferior, ...	Coal tar, ...
4390	Sour balls, ...	1.05	Good, ...	Coal tar, ...
4391	Candy eggs, ...	0.81	Good, ...	None, ...
4392	Suckers, ...	0.85	Inferior, ...	None, ...
4393	Marshmallow bananas, ...	0.59	Inferior, ...	Coal tar, ...
4394	Chocolate rabbits, ...	1.09	Inferior, ...	None, ...
4395	Candy beans, ...	0.71	Good, ...	Vegetable, ...
4396	Chocolate wafers, ...	0.67	Good, ...	None, ...
4397	Raspberry candy, ...	0.81	Good, ...	Coal tar, ...
4398	Red candy blocks, ...	0.56	Good, ...	Coal tar, ...
4399	Chocolate coated molasses candy, ...	1.34	Inferior, ...	None, ...
4400	Chocolate caramel rolls, ...	0.64	Good, ...	None, ...
4401	Suckers, ...	0.39	Good, ...	Coal tar, ...
4402	Cream candy, ...	0.88	Good, ...	None, ...
4403	Candy marbles, ...	0.81	Good, ...	None, ...
4404	Lime candy, ...	0.56	Good, ...	Vegetable, ...
4405	Caramels, ...	0.59	Good, ...	None, ...
4406	Cream candy balls, ...	1.09	Good, ...	None, ...
4407	Candy pans, ...	0.42	Good, ...	Coal tar, ...
4408	Gum drops, ...	0.95	Good, ...	Coal tar, ...
4409	Sugar cakes, ...	1.16	Good, ...	None, ...
4410	Candy rabbits, ...	1.62	Good, ...	None, ...
4411	Candy loaf, ...	0.35	Good, ...	None, ...
4412	Jelly eggs, ...	0.28	Good, ...	Coal tar, ...
4413	Kisses, ...	0.60	Good, ...	None, ...
4414	Fudge, ...	0.81	Good, ...	None, ...
4415	Peanut candy, chocolate coated, ...	0.64	Good, ...	None, ...
4416	Kisses, ...	0.81	Good, ...	None, ...
4417	Butterscotch, ...	0.90	Good, ...	None, ...
4418	Clear gum drops, ...	0.82	Good, ...	Coal tar, ...
4419	Candy loaf, ...	0.89	Good, ...	None, ...
4420	Fudge, ...	1.10	Good, ...	None, ...
4421	Chocolate bars, ...	0.71	Good, ...	None, ...

RESULTS.

Talc, terra alba, saccharin, benzoic or salicylic acid, sulphur dioxide.	Chocolate fat.	Remarks.
None, -----	-----	Wrapped in waxed paper.
None, -----	O. K., -----	Some of the nuts were wormy; gelatin present.
None, -----	Cocoanut fat present.	Gelatin present.
None, -----	O. K., -----	Membranous hulls of nuts present and many of the nuts wormy.
None, -----	Tallow present, -----	Surface of candy very dirty; gelatin present.
None, -----	-----	Gelatin present.
None, -----	-----	Gelatin present.
None, -----	-----	Wrapped in waxed paper.
None, -----	O. K., -----	-----
None, -----	O. K., -----	Very badly worm eaten.
None, -----	O. K., -----	-----
None, -----	O. K., -----	-----
None, -----	O. K., -----	-----
None, -----	O. K., -----	Surface of candy very dirty.
None, -----	O. K., -----	-----
None, -----	-----	-----
None, -----	-----	Contained traces of a non-resinous astringent glaze.
None, -----	-----	Gelatin present.
None, -----	Tallow present.	-----
None, -----	-----	Gelatin present.
None, -----	-----	-----
None, -----	-----	Appearance very dirty.
None, -----	-----	Appearance very dirty; odor glue-like.
None, -----	-----	-----
None, -----	-----	Wrapped in waxed paper.
None, -----	-----	Wrapped in waxed paper.
None, -----	-----	Very dirty; strongly flavored with ethereal flavor.
None, -----	-----	Very dirty; excessively colored and strongly flavored with ethereal flavor.
None, -----	-----	-----
None, -----	O. K., -----	Very dirty and mussy.
None, -----	-----	Appearance very dirty; very strongly flavored with ethereal flavor.
None, -----	-----	Very dirty and mussy.
None, -----	O. K., -----	-----
None, -----	-----	Very highly colored; ethereal flavor present.
None, -----	Cocoanut fat present.	Very messy and dirty in appearance.
None, -----	-----	Paper wrapped.
None, -----	-----	-----
None, -----	-----	-----
None, -----	-----	-----
None, -----	-----	-----
None, -----	-----	Small tin pan containing candy.
None, -----	-----	Ethereal flavor present.
None, -----	-----	-----
None, -----	-----	Each piece wrapped in tinfoil.
None, -----	-----	Each cent's worth in waxed paper bag.
None, -----	-----	Each piece wrapped in waxed paper.
None, -----	Tallow present.	-----
None, -----	-----	Each piece wrapped in waxed paper.
None, -----	-----	Each piece wrapped in waxed paper.
None, -----	-----	-----
None, -----	-----	Sample contained traces of a resinous glaze.
None, -----	-----	Sample contained traces of a resinous glaze.
None, -----	O. K., -----	-----

TABULATED

Agent's number.	Kind of Candy.	Oz. average for 1 cent.	Appearance.	Color.
4422	Red candy beans, ...	0.64	Good, ...	Coal tar, ...
4423	Mixed candy, ...	1.05	Inferior, ...	Coal tar, ...
4424	Mixed candy, ...	0.81	Inferior, ...	Coal tar, ...
4425	Suckers, ...	0.88	Good, ...	Coal tar, ...
4426	Candy eggs, ...	0.85	Good, ...	Coal tar, ...
4427	Marshmallow cones, ...	0.46	Fair, ...	Coal tar, ...
4428	Prize box, ...	0.39	Good, ...	Coal tar, ...
4429	Cocoanut blocks, ...	0.92	Good, ...	Coal tar, ...
4430	Licorice babies, ...	0.81	Good, ...	Carbon black, ...
4431	Cherry candy, ...	1.6	Good, ...	Coal tar, ...
4432	Molasses blocks, ...	1.2	Good, ...	None, ...
4433	Cream taffy, ...	0.78	Good, ...	None, ...
4434	Prize package, ...	0.32	Good, ...	None, ...
4435	Strawberry candy, ...	0.84	Good, ...	Coal tar, ...
365	Strawberry candy, ...	1.50	Good, ...	Coal tar, ...
4436	Mixed candy, ...	1.11	Inferior, ...	Coal tar, ...
4437	Chocolate cigars, ...	0.66	Good, ...	None, ...
4438	Chocolate marshmallows, ...	0.53	Fair, ...	None, ...
4439	Licorice tubes, ...	0.78	Fair, ...	Carbon black, ...
4440	Caramels, ...	1.02	Good, ...	None, ...
4441	Suckers, ...	1.37	Good, ...	None, ...
4442	Peanut candy, ...	0.92	Good, ...	None, ...
4443	Candy bars, ...	0.81	Good, ...	None, ...
4444	Marshmallows, ...	0.53	Good, ...	None, ...
4445	Jelly eggs, ...	1.05	Good, ...	Coal tar, ...
4446	Marshmallows, ...	0.53	Inferior, ...	None, ...
4447	Candy pies, ...	0.35	Inferior, ...	Coal tar, ...
4448	Orange candy, ...	1.09	Good, ...	Coal tar, ...
4449	Suckers, ...	0.63	Inferior, ...	Carbon black, ...
4450	Cocoanut candy, ...	1.09	Fair, ...	Coal tar, ...
4451	Chewing candy, ...	0.35	Good, ...	None, ...
4452	Marshmallows, ...	0.53	Good, ...	None, ...
4453	Nut fudge, ...	0.64	Good, ...	None, ...
4454	Mixed candy, ...	1.6	Inferior, ...	Coal tar, ...
4455	Marshmallows, ...	0.63	Good, ...	None, ...
4456	Marshmallow pears, ...	1.02	Good, ...	Coal tar, ...
4457	Marshmallows, ...	1.6	Inferior, ...	None, ...
4458	Candy bags, ...	1.0	Good, ...	None, ...
4459	Marshmallow bananas, ...	0.78	Good, ...	Coal tar, ...
4460	Chocolate fish, ...	0.88	Inferior, ...	None, ...
4461	Chocolate fudge, ...	1.6	Good, ...	None, ...
4462	Chocolate slabs, ...	0.78	Inferior, ...	None, ...
4463	Marshmallows, ...	0.84	Inferior, ...	Coal tar, ...
4464	Marshmallow rolls, ...	0.84	Good, ...	Coal tar, ...
4465	Nut fudge, ...	1.6	Inferior, ...	None, ...
4466	Prize boxes, ...	0.21	Good, ...	Coal tar, ...
4467	Marshmallows, ...	0.59	Inferior, ...	None, ...
4468	Chocolate fudge, ...	1.6	Inferior, ...	None, ...
4469	Sour balls, ...	0.74	Good, ...	Coal tar, ...
4470	Strawberry rolls, ...	1.05	Good, ...	Coal tar, ...
4472	Marshmallows, ...	0.71	Inferior, ...	None, ...
4473	Mixed candy, ...	0.81	Inferior, ...	Coal tar, ...
4474	Strawberry marshmallows, ...	0.91	Good, ...	Coal tar, ...
4475	Red candy blocks, ...	2.11	Good, ...	Coal tar, ...
4476	Suckers, ...	0.98	Good, ...	Coal tar, ...
4477	Marshmallow babies, ...	0.71	Fair, ...	Coal tar, ...
4478	Strawberry candy, ...	0.35	Inferior, ...	Coal tar, ...
4480	Molasses popcorn, ...	0.56	Good, ...	None, ...
4481	Nut fudge, ...	0.90	Good, ...	None, ...
4482	Marshmallow bananas, ...	0.71	Inferior, ...	Coal tar, ...
4483	Candy bows, ...	0.49	Good, ...	Coal tar, ...
4484	Mixed candy, ...	1.59	Inferior, ...	Coal tar, ...
4485	Marshmallows, ...	0.80	Inferior, ...	None, ...
4486	Chocolate bars, ...	0.85	Good, ...	None, ...
4487	Marshmallow biscuits, ...	1.02	Good, ...	Coal tar, ...
4488	Marshmallow bananas, ...	0.92	Good, ...	Coal tar, ...

RESULTS—Continued.

[illegible]

TABULATED

Agent's number.	Kind of Candy.	Oz. average for 1 cent.	Appearance.	Color.
4489	Chocolate fudge, ...	0.78	Inferior, ...	None, ...
4490	Gum drops, ...	0.64	Good, ...	Coal tar, ...
4491	Jelly beans, ...	0.78	Good, ...	Coal tar, ...
4492	Licorice cigarettes, ...	0.71	Good, ...	Carbon black, ...
4493	Cinnamon drops, ...	0.78	Good, ...	Coal tar, ...
4494	Chocolate drops, ...	0.81	Inferior, ...	None, ...
4495	Candy peaches, ...	0.81	Good, ...	Coal tar, ...
4496	Marshmallow bananas, ...	0.95	Inferior, ...	Coal tar, ...
4497	Marshmallow blocks, ...	0.85	Good, ...	Coal tar, ...
4498	Marshmallows, ...	0.81	Good, ...	None, ...
4499	Candy balls, ...	1.02	Good, ...	Vegetable, ...
4500	Candy pears, ...	1.12	Good, ...	Coal tar, ...
4501	Suckers, ...	0.92	Good, ...	None, ...
4502	Marshmallow fish, ...	0.60	Inferior, ...	None, ...
4503	Chocolate drops, ...	1.00	Inferior, ...	None, ...
4504	Chocolate cigarettes, ...	0.71	Good, ...	None, ...
4505	Orange candy, ...	0.85	Good, ...	Vegetable, ...
4506	Chocolate babies, ...	0.88	Inferior, ...	None, ...
4507	Candy shortcake, ...	0.92	Good, ...	Coal tar, ...
4508	Bonbons, ...	1.05	Good, ...	Vegetable, ...
4509	Marshmallow bananas, ...	1.23	Good, ...	Coal tar, ...
4510	Marshmallow bars, ...	0.71	Good, ...	Coal tar, ...
4511	Strawberry candy, ...	0.59	Good, ...	Coal tar, ...
4512	Chocolate pipes, ...	0.81	Good, ...	None, ...
4513	Candy babies, ...	0.59	Inferior, ...	Coal tar, ...
4514	Cocoanut balls, ...	1.00	Good, ...	Coal tar, ...
4515	Chocolate dogs, ...	1.12	Inferior, ...	None, ...
4516	Marshmallow slabs, ...	0.71	Good, ...	Coal tar, ...
4517	Mixed candy, ...	1.00	Inferior, ...	Coal tar, ...
4518	Candy berries, ...	0.95	Good, ...	Coal tar, ...
4519	Toasted marshmallows, ...	0.88	Inferior, ...	None, ...
4520	Prize bags, ...	0.31	Good, ...	Coal tar, ...
4521	Mixed candy, ...	0.81	Good, ...	Coal tar, ...
4522	Candy beans, ...	0.81	Good, ...	Coal tar, ...
4523	Candy bananas, ...	0.81	Good, ...	Coal tar, ...
4524	Cocoanut marshmallows, ...	0.78	Good, ...	None, ...
4525	Orange blocks, ...	0.78	Good, ...	Coal tar, ...
4526	Candy balls, ...	0.74	Good, ...	Coal tar, ...
4527	Chocolate creams, ...	0.81	Inferior, ...	None, ...
4528	Salt water taffy, ...	0.95	Good, ...	Coal tar, ...
4529	Candy oranges, ...	1.09	Good, ...	Coal tar, ...
4530	Candy berries, ...	0.99	Good, ...	Coal tar, ...
4531	Candy plates, ...	0.78	Fair, ...	Coal tar, ...
4532	Fudge, ...	0.84	Good, ...	None, ...
4533	Chocolate drops, ...	1.05	Inferior, ...	None, ...
4534	Marshmallow slabs, ...	1.30	Inferior, ...	Vegetable, ...
4535	Marshmallow slabs, ...	0.42	Inferior, ...	Coal tar, ...
4536	Candy sandwiches, ...	0.53	Inferior, ...	None, ...
4537	Marshmallows, ...	0.92	Inferior, ...	None, ...
4538	Candy carrots, ...	0.63	Good, ...	Coal tar, ...
4539	Candy cones, ...	0.46	Good, ...	None, ...
4540	Orange candy, ...	0.88	Good, ...	Vegetable, ...
4541	Candy bananas, ...	0.63	Good, ...	Coal tar, ...
4542	Mixed candy, ...	0.78	Good, ...	Coal tar, ...
4543	Marshmallows, ...	0.71	Good, ...	Coal tar, ...
4544	Orange candy, ...	1.15	Good, ...	Coal tar, ...
4545	Suckers, ...	0.99	Good, ...	Coal tar, ...
4546	Fudge, ...	1.58	Inferior, ...	None, ...
4547	Cocoanut candy, ...	2.1	Inferior, ...	Coal tar, ...
4548	Marshmallow rolls, ...	0.60	Inferior, ...	None, ...
4549	Candy dogs, ...	0.64	Good, ...	Coal tar, ...
4550	Candy licorice strips, ...	0.85	Good, ...	Carbon black, ...
4551	Candy licorice strips, ...	0.71	Good, ...	Carbon black, ...
4552	Mint sticks, ...	1.05	Good, ...	Coal tar, ...
4553	Chocolate rabbits, ...	0.74	Inferior, ...	None, ...

RESULTS—Continued.

Talc, terra alba, saccharin, benzoic or salicylic acid, sulphur dioxide.	Chocolate fat.	Remarks.
None, -----	-----	Very dirty.
None, -----	-----	-----
Talc present, -----	-----	Talc present in the coating.
None, -----	-----	Oil anise flavor.
None, -----	-----	Excessively colored.
None, -----	O. K., -----	Very dirty.
None, -----	-----	Gelatin present; odor glue-like.
None, -----	-----	Gelatin present; ethereal flavor present; very dirty and mussy.
None, -----	-----	-----
None, -----	-----	-----
None, -----	-----	-----
Sulphur dioxide present, -----	-----	Gelatin present; odor glue-like. SO ₂ present in appreciable amount.
None, -----	-----	Very dirty.
None, -----	O. K., -----	Very dirty.
None, -----	O. K., -----	In paper wrapper.
None, -----	-----	-----
None, -----	Ocoanut fat present. -----	Very mussy.
None, -----	-----	Gelatin present.
None, -----	-----	-----
None, -----	-----	Gelatin present; ethereal flavor present; coal tar color excessive.
None, -----	-----	Gelatin present; odor glue-like.
None, -----	-----	Gelatin present; odor glue-like.
None, -----	O. K., -----	Gelatin present.
None, -----	-----	Gelatin present; odor glue-like; ethereal flavor present; very dirty.
None, -----	-----	-----
None, -----	O. K., -----	Very mussy.
None, -----	-----	Gelatin present; odor glue-like.
None, -----	-----	Very dirty.
None, -----	-----	Very dirty.
None, -----	-----	-----
None, -----	-----	Gelatin present; ethereal flavor present.
None, -----	-----	Gelatin present; ethereal flavor present.
None, -----	-----	Gelatin present; odor glue-like.
None, -----	-----	Gelatin present.
None, -----	-----	Gelatin present; odor glue-like.
None, -----	-----	Very dirty and mussy.
None, -----	-----	Each piece in waxed paper.
None, -----	-----	-----
None, -----	-----	Some pieces dirty.
None, -----	-----	-----
None, -----	-----	Sample was dirty.
None, -----	-----	Sample was dirty.
None, -----	-----	Gelatin present; odor glue-like; sample was dirty.
None, -----	-----	Gelatin present; sample was very dirty.
None, -----	-----	Gelatin present; odor glue-like; sample was dirty.
None, -----	-----	-----
None, -----	-----	Gelatin present; ethereal flavor present.
None, -----	-----	Gelatin present.
None, -----	-----	Gelatin present; ethereal flavor present in excessive amount.
None, -----	-----	Gelatin present.
None, -----	-----	Gelatin present.
None, -----	-----	Each piece wrapped in waxed paper.
None, -----	-----	Very mussy and dirty.
None, -----	-----	Sample very dirty.
None, -----	-----	Sample very dirty.
None, -----	-----	Gelatin present.
None, -----	-----	Aniseed flavor present.
None, -----	-----	Aniseed flavor present.
None, -----	-----	-----
None, -----	(?) -----	Very dirty.

TABULATED

Agent's number.	Kind of Candy.	Oz. average for 1 cent.	Appearance.	Color.
4554	Taffy and licorice, ...	0.88	Good, ...	Carbon black, ...
4555	Marshmallows, ...	0.67	Good, ...	Coal tar, ...
4556	Chewing candy, ...	0.99	Good, ...	None, ...
4557	Candy bananas, ...	0.64	Good, ...	Coal tar, ...
4558	Nougat, ...	0.92	Good, ...	None, ...
4559	Prize candy, ...	0.49	Good, ...	Vegetable, ...
4560	Cocoanut bars, ...	1.15	Good, ...	Coal tar, ...
4561	Kisses, ...	1.23	Good, ...	None, ...
4562	Caramels, ...	0.81	Inferior, ...	None, ...
4563	Kisses, ...	0.81	Good, ...	None, ...
4564	Taffy, ...	0.74	Good, ...	None, ...
4565	Chocolate babies, ...	0.63	Good, ...	None, ...
4566	Peanut blocks, ...	0.95	Good, ...	None, ...
4567	Kisses, ...	1.05	Good, ...	None, ...
4568	Chocolate caramel sticks, ...	0.50	Good, ...	None, ...
4569	Chocolate sticks, ...	0.49	Inferior, ...	None, ...
4570	Candy bananas, ...	0.74	Good, ...	Coal tar, ...
4571	Licorice sticks, ...	0.50	Good, ...	Carbon black, ...
4572	Licorice drops, ...	0.49	Good, ...	Carbon black, ...
4573	Candy cigarettes, ...	0.53	Good, ...	None, ...
4574	Kisses, ...	1.38	Good, ...	None, ...
4575	Licorice sticks, ...	1.59	Good, ...	Carbon black, ...
4576	Candy fish, ...	0.85	Inferior, ...	Coal tar, ...
4577	Kisses, ...	1.19	Good, ...	None, ...
4578	Candy cherries, ...	1.33	Good, ...	Coal tar, ...
4579	Prize package, ...	0.39	Good, ...	Vegetable, ...
4580	Candy beads, ...	0.49	Good, ...	Coal tar, ...
4581	Chocolate drops, ...	1.05	Inferior, ...	None, ...
4582	Kisses, ...	0.78	Good, ...	None, ...
4583	Fudge, ...	1.59	Good, ...	None, ...
4584	Licorice beans, ...	1.59	Good, ...	Carbon black, ...
7391	Chocolate taffy, ...	0.78	Good, ...	None, ...
7392	Marshmallows, ...	0.46	Good, ...	Coal tar, ...
7393	Assorted candy drops, ...	1.09	Good, ...	Vegetable, ...
7394	Candy bananas, ...	0.88	Inferior, ...	Coal tar, ...
7395	Raspberry drops, ...	0.56	Good, ...	Vegetable, ...
7396	Marshmallow fruit, ...	0.85	Inferior, ...	None, ...
3301	Peanut candy, ...	0.81	Good, ...	None, ...
3302	Marshmallows, ...	0.74	Good, ...	None, ...
3303	Candy bananas, ...	0.71	Good, ...	Coal tar, ...
3304	Marshmallows, ...	0.85	Good, ...	Coal tar, ...
3305	Chocolate marshmallows, ...	0.56	Inferior, ...	None, ...
3306	Chocolate slabs, ...	0.71	Good, ...	None, ...
3307	Kisses, ...	0.71	Good, ...	None, ...
3308	Candy sticks, ...	0.67	Inferior, ...	Coal tar, ...
3309	Licorice sticks, ...	1.48	Good, ...	Carbon black, ...
3310	Candy cakes, ...	0.49	Good, ...	Coal tar, ...
3311	Paraffin chewing gum, ...	0.42	Inferior, ...	None, ...
3312	Shortcake candy, ...	0.67	Good, ...	None, ...
3313	Kisses, ...	0.95	Good, ...	None, ...
3314	Licorice sticks, ...	0.42	Good, ...	Carbon black, ...
3315	Licorice strips, ...	0.81	Good, ...	Carbon black, ...
3316	Candy eggs, ...	0.19	Good, ...	Coal tar, ...
3317	Suckers, ...	1.09	Good, ...	Coal tar, ...
3318	Licorice sticks, ...	1.05	Good, ...	Carbon black, ...
3319	Suckers, ...	0.74	Good, ...	None, ...
3320	Prize candy, ...	0.39	Good, ...	Coal tar, ...
3321	Strawberry candy, ...	0.53	Good, ...	Vegetable, ...
3322	Suckers, ...	0.99	Good, ...	Coal tar, ...
3323*	Licorice sticks, ...	1.37	Good, ...	Carbon black, ...
3324	Kisses, ...	0.63	Good, ...	None, ...
3325	Marshmallows, ...	0.74	Good, ...	None, ...
4584	Jelly beans, ...	1.59	Inferior, ...	Coal tar, ...
4585	Jelly beans, ...	1.23	Good, ...	Coal tar, ...

*An interesting fact in connection with licorice candy is, that for years it has been the custom of manufacturers to add aniseed flavor so that the popular impression of the public at the present time is that anything flavored with anise contains licorice. The use of a carbon black color in licorice goods is due to the fact that the varying amounts of licorice extract which are used would give the products varying shades of brown and the black color is therefore added because of the popular idea that licorice candy should be black. It is also of interest to note in this connection that in some instances, while the goods are sold at retail as licorice goods, the packages or labels do not bear the word at all.

RESULTS—Continued.

Talc, terra alba, saccharin, benzoic or salicylic acid, sulphur dioxide.	Chocolate fat.	Remarks.
None, ...		Aniseed flavor present.
None, ...		Gelatin present; odor glue-like.
None, ...		Gelatin present, ethereal flavor and coal tar color present in excessive amount.
None, ...		In pasteboard box.
None, ...		Coal tar color present in excessive amount.
None, ...		Each piece wrapped in waxed paper.
None, ...	O. K., ...	Very mussy and dirty.
None, ...		Each piece wrapped in paper.
None, ...	(?)	Slight flavor of chocolate.
None, ...		Each piece wrapped in waxed paper.
None, ...		Each piece wrapped in waxed paper.
None, ...	Tallow present(?)	Very dirty and wormy.
None, ...		Gelatin present; ethereal flavor present in excessive amount.
None, ...		Aniseed flavor present.
None, ...		Aniseed flavor present.
None, ...		Wrapped in paper.
None, ...		Each piece wrapped in waxed paper.
None, ...		Aniseed flavor present.
None, ...		Gelatin present; very dirty.
None, ...		Each piece wrapped in waxed paper.
None, ...		In pasteboard box.
None, ...	O. K., ...	Very mussy and dirty.
None, ...		Each piece wrapped in waxed paper.
None, ...	O. K., ...	Aniseed flavor present.
None, ...		Gelatin present; ethereal flavor present; very dirty.
None, ...		Very dirty.
None, ...		Each piece wrapped in waxed paper.
None, ...		Gelatin present; ethereal flavor present.
None, ...		Gelatin present; odor glue-like.
None, ...	O. K., ...	Very mussy.
None, ...	Tallow present(?)	Each piece wrapped in waxed paper.
None, ...		Very dirty and excessively highly colored.
None, ...		Aniseed flavor present.
None, ...		Very dirty.
None, ...		Each piece wrapped in waxed paper.
None, ...		Aniseed flavor present.
None, ...		Aniseed flavor present.
None, ...		Each piece wrapped in waxed paper.
None, ...		Aniseed flavor present.
None, ...		Sample in pasteboard box.
None, ...		Each piece wrapped in waxed paper.
None, ...		Aniseed flavor present.*
None, ...		Each piece wrapped in waxed paper.
None, ...		Very dirty.
Talc present, ...		Sample is coated with talc.

In the foregoing tabulation, especial attention is called to the fact that 62 of the samples, or nearly 24 per cent., were in a condition described as 'dirty,' and it avails but little to make a product of wholesome materials and then allow it to become contaminated with dirt before it is sold. I would also emphasize the fact that competition among manufacturers to introduce new forms and to give an apparently large amount for the money has led to the concoction of mixtures of sugar, gums, starches or flours, gelatin and water, which, while undoubtedly wholesome as individual ingredients, are nevertheless so combined as to form spongy or tenacious, slowly soluble masses, which certainly possess every appearance of being indigestible or unwholesome, taking into account the cheapness and the large amount which might be eaten by a child.

The practice of combining toys with candies or of making articles of candy which are likely to be played with for some time before being eaten, as is done in numerous instances, should also be discouraged. Such candy forms as marbles, whistles, windmills, belts and necklaces, are likely to be utilized, before eating, in ways which largely increase the chances of dangerous contamination. These forms are undoubtedly attractive to children on account of the double purpose which they serve, but there is a moral responsibility concerning the manufacture of these specialties which the maker should assume, and their manufacture and sale should be discouraged in every way possible.

It is gratifying to know that the use of the so called "ethereal" flavors is decreasing, only 21 samples out of 259 being found in which they were especially noticeable, and these mainly of the marshmallow banana type, of which some instances were observed where the amount of flavor was excessive, presumably to cover up the glue like flavor of cheap gelatin, which flavor was plainly observed in some samples.

It is interesting also to note that there is very little evidence of the use of the resinous glazes which were so extensively employed formerly. It is true that in the class of samples examined resinous glazes are rarely necessary and in the few instances in which any evidence of their presence was found the amount was so small that it was barely recognizable. This is in strong contrast to the samples examined over a year ago in the Philadelphia district when large amounts were found. One instance is recalled of a sample purchased there in which a drachm of shellac was separated from a pound of candy. Such treatment could only be characterized as weather proofing, and it is well for the consumer that such practices have apparently been discontinued.

In summarizing the results of the foregoing examination, I would say that while marked improvement is observed in the quality of cheap candies as regards freedom from actually harmful ingredients, there is still room for great improvement in the quality of some of the ingredients used, in the form in which candies are made and sold as well as in the manner of their handling so as to keep them free from dirt.

Respectfully submitted,

CHARLES H. LaWALL.



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